MARCH 14, 1960

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

Red China Demonstrates New Metalworking Savvy

But her production fell short of the original 1959 goals. Communists claim steel output topped 13 million tons and pig iron hit 10 million tons. They're making more of their own equipment, but pictures show it lacks the refinement of Western counterparts. For details, see Page 57.

Partmakers Hold the Price Line; Future Changes Hinge on Steel

Army Unveils New Fluid Control Unit Which Has No Moving Parts

Should You Move to the Suburbs?

Knowing the Precise Temperatures Can Pay Off—Here's How It's Done

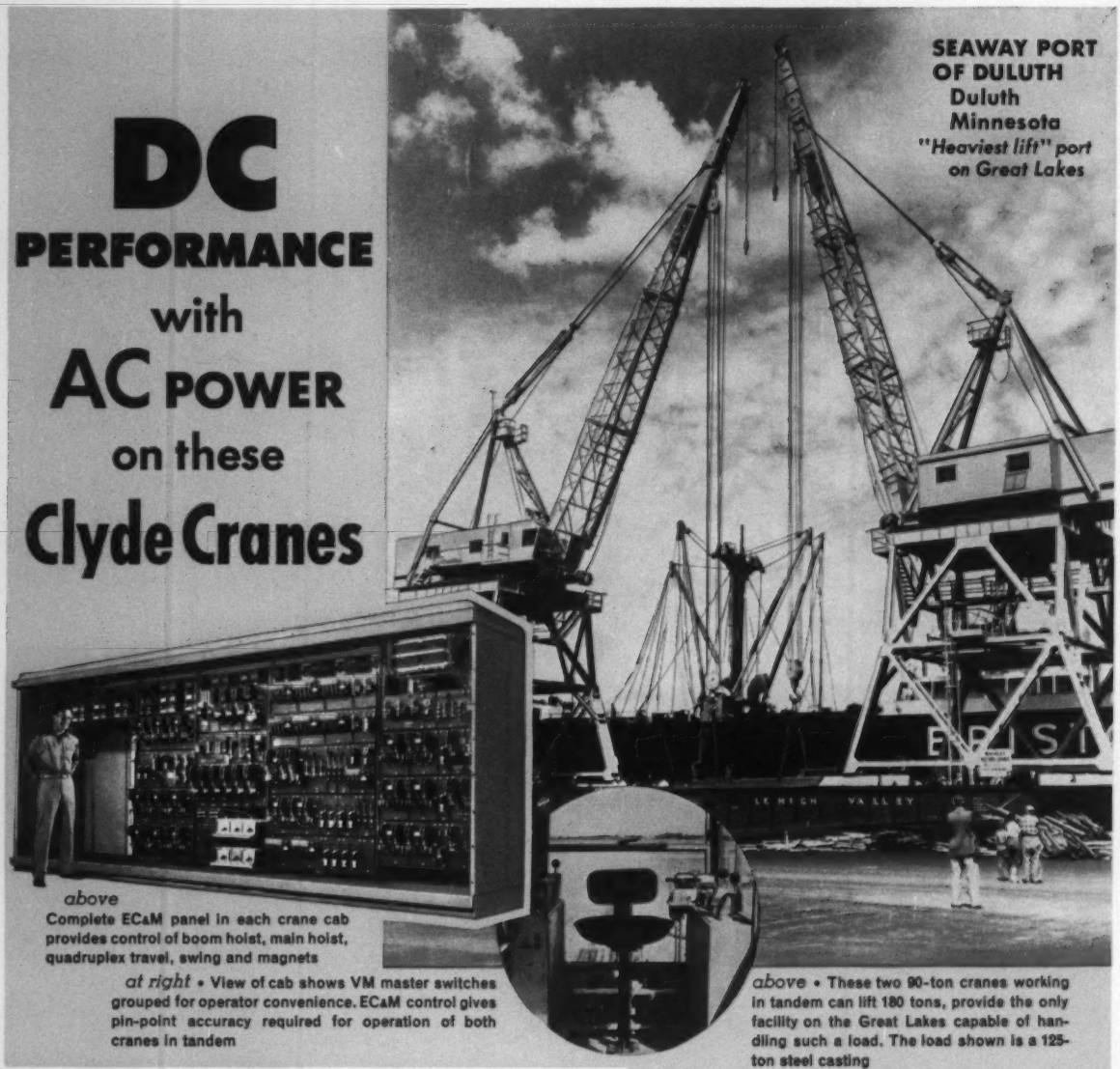
Tips for Buttwelding Aluminum

Aluminum Fights for New Sales Peak

COMPLETE CONTENTS
TURN PAGE

METALWORKING WEEK
PAGE 37

DC PERFORMANCE with AC POWER on these Clyde Cranes



SEAWAY PORT OF DULUTH
Duluth
Minnesota
"Heaviest lift" port on Great Lakes

above
Complete ECaM panel in each crane cab provides control of boom hoist, main hoist, quadruplex travel, swing and magnets

at right • View of cab shows VM master switches grouped for operator convenience. ECaM control gives pin-point accuracy required for operation of both cranes in tandem

above • These two 90-ton cranes working in tandem can lift 180 tons, provide the only facility on the Great Lakes capable of handling such a load. The load shown is a 125-ton steel casting

EC&M "HWR" CONTROL does it safer, simpler

EC&M's HWR Controllers provide AC cranes with all the advantages of DC hoist control. Smaller hoist motors can be used than in equivalent AC systems. Moreover, HWR control, with its series motor and brake, provides the simplest and safest operation.

Highly efficient silicon rectifiers (self-contained in the controller) furnish the DC power. Exclusive WRIGHT dynamic lowering circuit combines high-speed handling with accuracy in spotting any load.

HWR controllers are easy to install. On EOT cranes, only four power collectors are needed. Circuitry is simple and the controller is easy to inspect. If you would like DC performance with AC power, check into EC&M's HWR controller.

Get the complete story on HWR controllers. Your Square D Field Engineer can give you the facts, or write Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio

SQUARE D COMPANY
EC&M DIVISION • CLEVELAND 28, OHIO

wherever electricity is distributed and controlled

4173

This Week in STEEL

The Metalworking Weekly

March 14, 1960 Vol. 146 No. 11

Partmakers Hold the Price Line

Costs of your components are holding steady. Sales of metalworking's partmakers are running 2 to 20 per cent ahead of 1959, but some soft spots are appearing and competition is tougher. Any price revisions hinge on steel prices this fall. PAGE 47

Army Unveils Fluid Control with No Moving Parts

A fluid amplifier no bigger than your fingernail may replace transistors in tomorrow's computer applications. A technological breakthrough, revealed by Army researchers, indicates that fluid controls, with no moving parts, have applications in machine tools, power steering, even hydroelectric generating stations. The Army foresees a new industry in embryo; you can demonstrate the new technology with your garden hose. PAGE 49

Should You Move to the Suburbs?

A number of firms have rejected plans to relocate in suburbs rather than disrupt supply lines, desert labor or sales markets, or pay more for services. On the other hand, some companies have left cities because of overcrowded or outdated facilities. In Cleveland, expansion of Republic Steel Corp. has been choked off by lack of space; a remedy is being sought. Chicago and Detroit have both undertaken industrial reclamation projects. Before you decide whether or not to move, see . . . PAGE 50

Knowing the Precise Temperatures Can Pay Off

In the Space Age, you'll be meeting temperature measurement problems once pondered only in the laboratory. More precise measurement will be the price for getting the most out of available materials. Ultrahigh and ultralow temperatures require involved new methods, while more accurate control is difficult and expensive. For an analysis of the problems and procedures you'll be encountering, see PAGE 94

Tips for Buttwelding Aluminum

Expect wider applications for flash buttwelded aluminum alloys as a result of techniques checked out by Lockheed Aircraft Corp., Burbank, Calif. Lockheed tells the Air Force such joints will adequately meet military and civilian needs. PAGE 110

Aluminum Fights for New Sales Peak

The light metal should hit new peaks in both production and sales this year. The forecast: Sales, up 10 to 15 per cent; primary production, a new summit at 2.1 million tons. With availability assured, look for new applications, steady prices. PAGE 135

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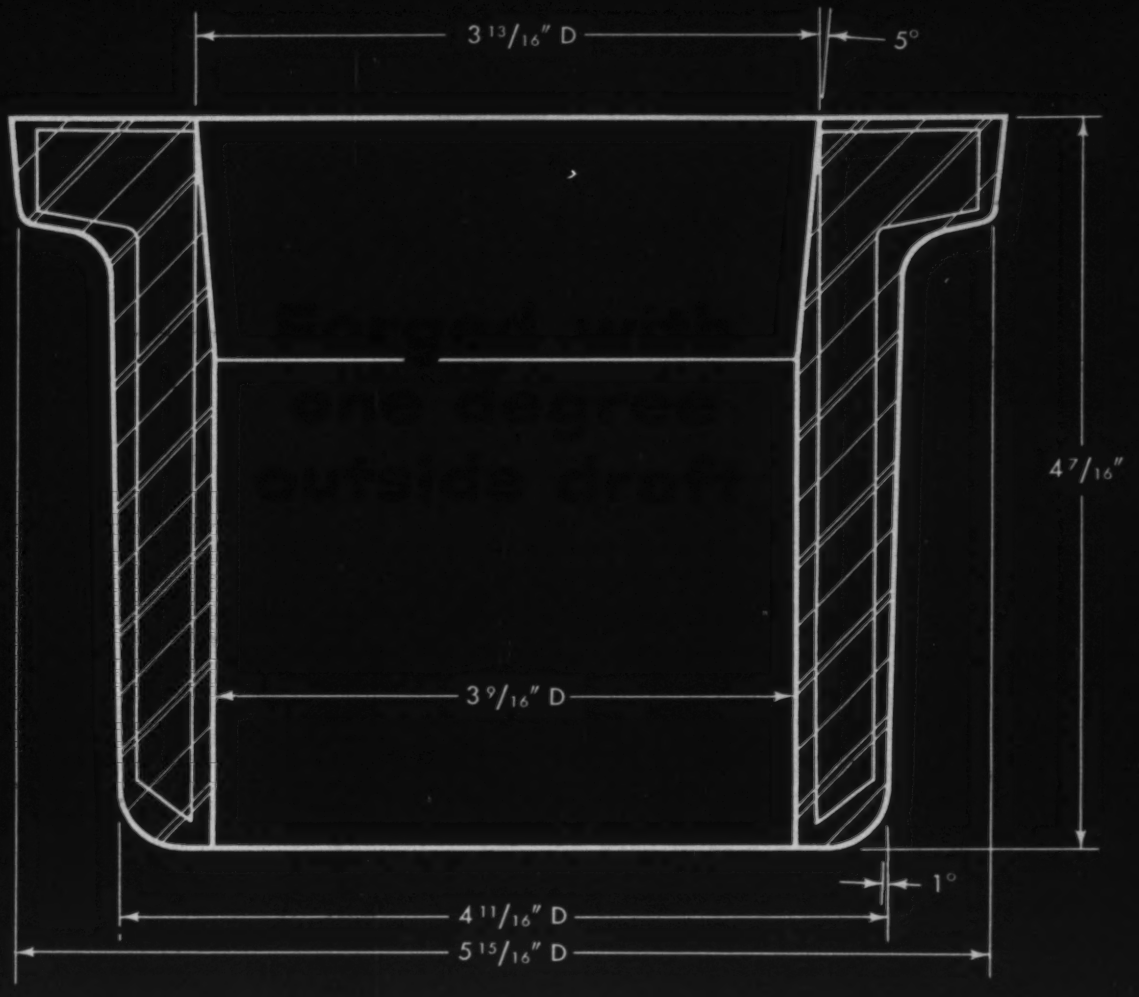

...to save metal and machining dollars

Forging with minimum external and internal drafts is a Bethlehem specialty. Witness the closure hub above.

We forge this part and others like it in a mechanical press to 1 degree outside draft, 5 degree inside draft. Then we hot-broach the inside draft to facilitate internal chucking. By the time this hub arrives at our customer's machine shop, little machining is required. Machining's a lot safer, easier, and faster, too. Because of the small drafts, chuck jaws can get a big bite on the part. They won't slip. Our customer can safely use higher horsepower machine tools, and speed his work.

Because we're able to forge to 1 degree drafts *or less*, the weight of the product can be reduced. That saves metal as well as machining dollars. We'd like to pass on similar savings to you. Call or write our nearest sales office today.

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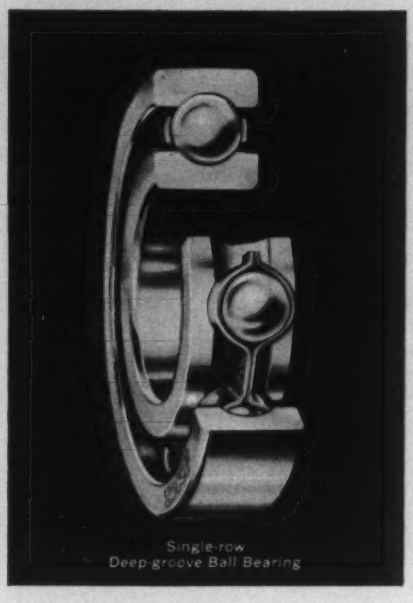
Export distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



Can a standard bearing offer you "more bearing" for your money?

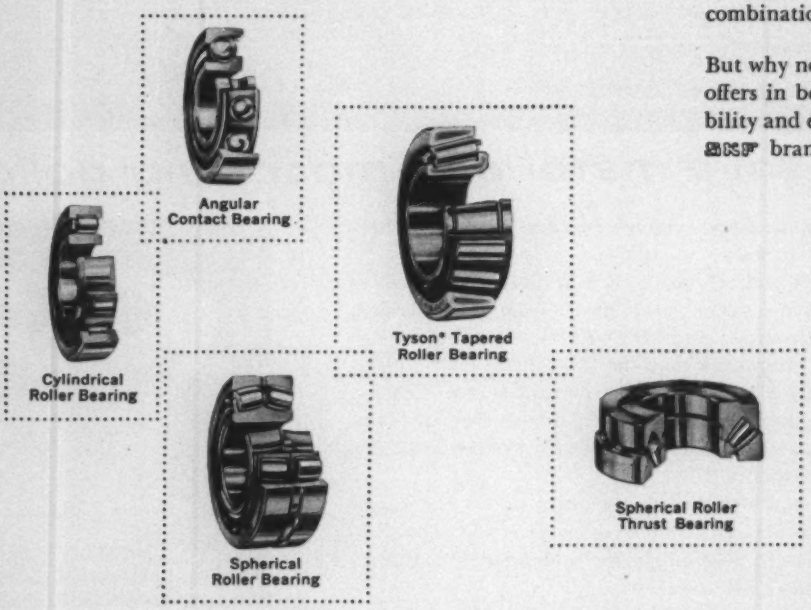
It can if it's made by SKF—because all SKF bearings, both ball and roller, offer special qualities at "production" bearing prices.

Take the single-row deep-groove ball bearing featured here, as an example. SKF designs and builds this type to sustain heavy radial load and thrust load in either direction. Furthermore, it is engineered to run smoothly and quietly at normal speeds with grease lubrication—and at high speeds with oil.

Yet this is a standard SKF ball bearing, mass-produced by automated production equipment at our plant at Altoona, Pa. You can quickly get this bearing in over 100 sizes, ranging from 5/8" to 15.748" O.D., and in a variety of seal, shield and snap-ring combinations.

But why not find out what SKF offers in bearing quality, availability and economy? Just call the SKF branch office nearest you

6001



Spherical, Cylindrical, Ball, "Tyson" Tapered and REED Miniature Bearings
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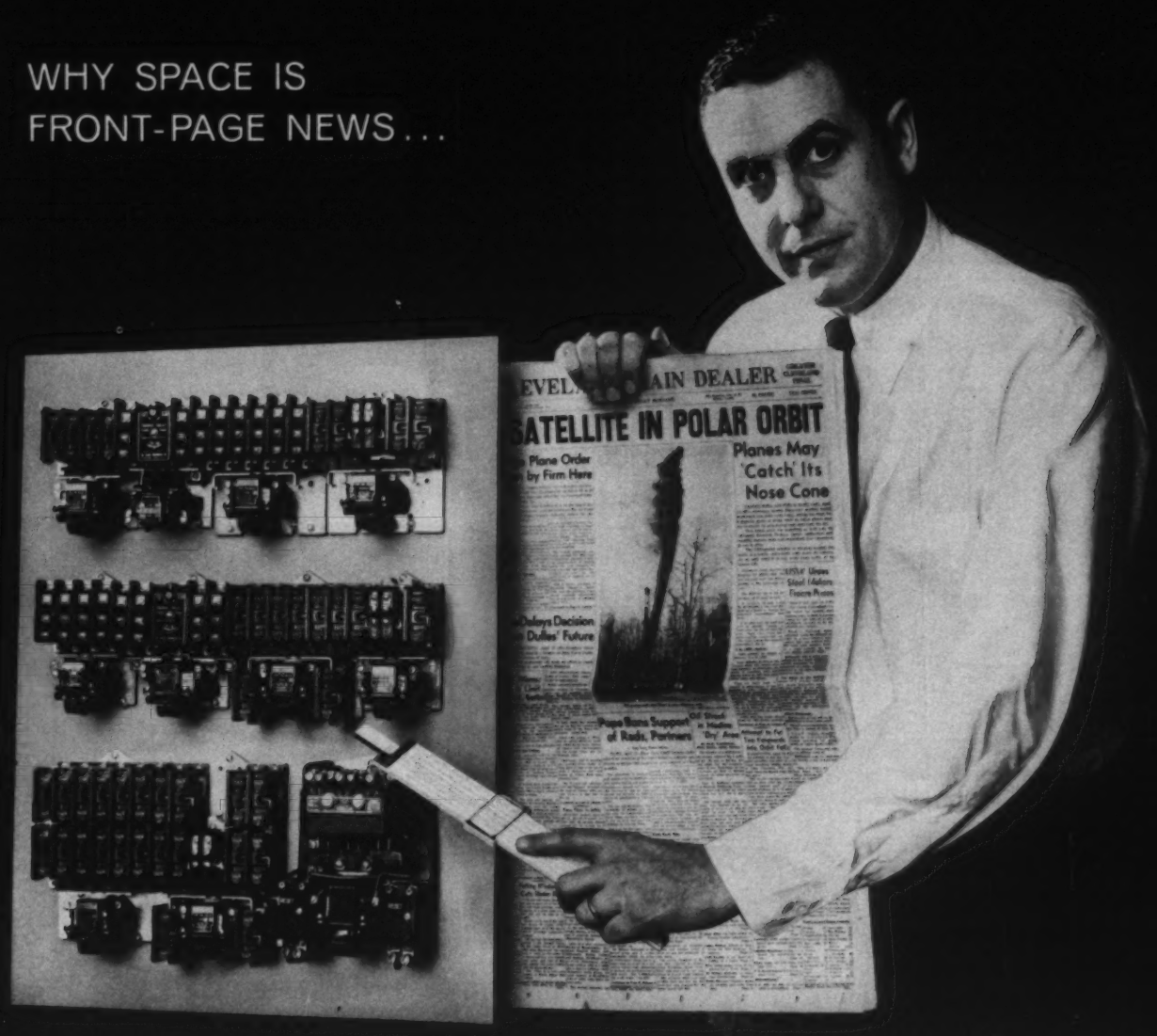
WHY SPACE IS
FRONT-PAGE NEWS...



Compact Clark Relays control 72 circuits from panel area smaller than a newspaper

In this day of space exploration and space economy, it's news—front page news—when you can get 72 separate, controlled circuits all on a panel no larger than 15" x 20".

Clark Controller, with the most complete and integrated line of control relays available today—convertible pole, latch, universal pole, and time delay—does it! And only Clark offers such a wide range of operation, so many contacts, in a panel area of such small size.

Shown mounted here with the Clark Size 1, Type "CY" Starter are 10 compact Clark Relays which include four time delay contacts (two normally open, two normally closed), 52 instantaneous contacts (14 normally open, 14 normally closed, and 24 convertible), plus 16 latching contacts (all convertible).

The same engineering leadership and superior workmanship that made Clark Controller the *standard of quality* for controls in heavy industry, is inherent in the broad line of Clark Relays for modern panels.

The "modular construction" of all Clark "PM" Relays insures integrated uniformity, compactness and flexibility. Functional alignment in mounting results in neater, more uniform panels and most efficient utilization of valuable space. And because "PM" relays are available in a wide variety of pole combinations, providing up to 14 contacts on a single relay, you can control more circuits—save on relay requirements.

For more information on the complete line of Clark "PM" Relays which is making space-saving headlines, contact your nearest Clark Controller sales office or distributor. Or, write direct to Clark Controller for free bulletins.

The
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Company

"Everything Under Control"

Main Plant: *Cleveland 10* • **Western Plant:** *Los Angeles 58*
In Canada: *Canadian Controllers, Limited, Toronto*

NICKELOID METALS IN A *Woman's World*

Part of that happy gleam in the eyes of a modern homemaker is because of the convenience, the ease, and the pleasant decorative warmth of her kitchen. Along with the soft woods and pleasant colors she revels in the easy-to-maintain gleam of clean bright appliances, housewares, working surfaces and decorative trim. The efficient chromium and the warm copper . . . seen so much about the modern kitchen . . . are most probably stamped or fabricated from one of the versatile galaxy of Nickeloid Metals. There's eye appeal and there's sales appeal in appliances and housewares which utilize Nickeloid Metals. Liked, too, by designers and production engineers. Complete information about Nickeloid Metals and the Nickeloid pre-finished metals method is contained in a special kit, which will be mailed you on request.

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Comments from the Stacks

"I just had to stop at Page 38 of STEEL, Feb. 22, to write you a note on 'Use a Library to Keep Pace,'" says Mrs. Elizabeth H. Kirchhof, librarian, Universal-Cyclops Steel Corp., Bridgeville, Pa.

"Whoever wrote it is to be commended on the fairness, truth, and timeliness of the article. There is the entire story of Special Libraries Association—in a nutshell, fair and square. This article should help dispel conversations about why a steel company needs a library . . . Only wish I had more time to tell you all I tell inquirers, but I want to hurry back to Page 39."

A Problem of Space

The panel of judges in our Usership Idea of the Month contest, a group of STEEL editors, got a pile of entries sooner than they expected. They were overflowing our orange crate desk and we were forced to make room to continue our work. We made a few notes in glancing through some of the entries. Here's a cross section: "Made scrap savings . . . broadened market coverage . . . instituted inventory control . . . expanding use of numerical control . . ." and on and on.

One fellow said: "I wish to thank the Servicenter for reminding me of the importance of interpretive reading for possible specific application in our everyday problems." No thanks needed—just start riffling the pages of STEEL (when you've finished this column, of course) and enter the contest.

Here's the Way to Do It

Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month — March, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—you will win $500.

There's more . . . you will win an additional $500 if you furnish written proof that you were successful in accomplishing your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

Entries will be judged by a committee of STEEL editors. All letters become the property of STEEL Magazine.

Remember, you can enter as many times as you wish. We urge you to be specific—give figures, examples, and illustrations to add to clarification. Deadline for the March contest is May 1, 1960. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

Labor's Bright Young Men

The next time your company's employment recruiter visits a college, there's a good chance he will miss at least two students in each industrial relations class. They are the graduates-to-be who declare they want to work for unions in a professional capacity, claims one union executive. Since World War II, this group of potential union staffers has become more and more important.

"Who are these young men? What lures them to labor's side?" Those and a flock of other questions in an assignment from STEEL's News Desk sent our editors into action. They interviewed youthful laborites and checked labor contacts for opinions.

They found unions broadening front echelons by seeking top lawyers, pension consultants, economists, and public relations counselors. One editor said he talked with five times as many people as will be named in the article. It's a hot topic and no one wanted to get burned. You can read about it in next week's issue.

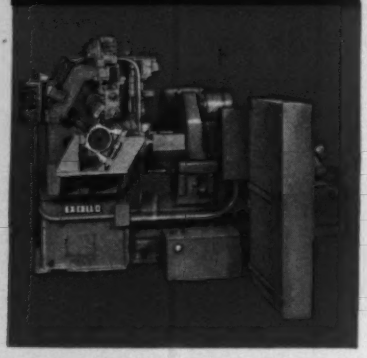
Did You Know . . .

. . . It is said that King Henry I established the yard by measuring the distance between the tip of his finger and the tip of his nose? How about this one by pronouncement of King Edward II: An inch is three, dry, round barley corns laid end to end. For a capper: The mile is the thousand double steps of the Roman soldier.

If we may move from the casual to the precise, let's talk about an article that lies some pages to the right of here. In it, Ed Case, our metallurgical editor, explores the field of temperature measurement. As an aid to readers, Ed has developed a nomographic conversion scale for temperatures in centigrade, Fahrenheit, Rankine, and Kelvin. The scale's range is from absolute zero to over 9000° F.

We're as cautious as a cat in a room full of

Step-by-Step Automation with Ex-Cell-O Specials



Your first step into automation may cost much less than you think. In medium-sized shops, for example, a profitable, automated set-up may involve the purchase of a relatively simple transfer machine, such as the one illustrated above, consisting of two standard way-type units. Or, even more simply, a single standard machine which easily fits into automated set-ups later on.

In any case, a host of Ex-Cell-O engineers, laboratory technicians and production specialists are at your service. *No obligation whatsoever.* Call your Ex-Cell-O Representative or write Ex-Cell-O, Detroit.

SEND FOR FREE BROCHURE

This 20-page catalog will show you the most profitable way to put automation into your present operations—make your own "Automation Appraisal." Ask for Bulletin 50155.

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57-88

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN

rocking chairs when it comes to claiming firsts. Let's just say we think Ed's conversion scale is mighty fine—you can judge for yourself.

Picking Up Where We Left Off...

. . . a week ago, we continue with our description of The Penton Publishing Co.'s continuing census of metalworking plants.

It was born 21 years ago and was the first real census of manufacturing plants outside the U. S. Bureau of Census. Since its birth, an average of 50,000 questionnaires have been mailed annually to plants to develop statistical data and find out who should receive STEEL. Hundreds of national, state, and local directories, plus many other reliable sources, are used in gathering preliminary information.

Finding New Entries

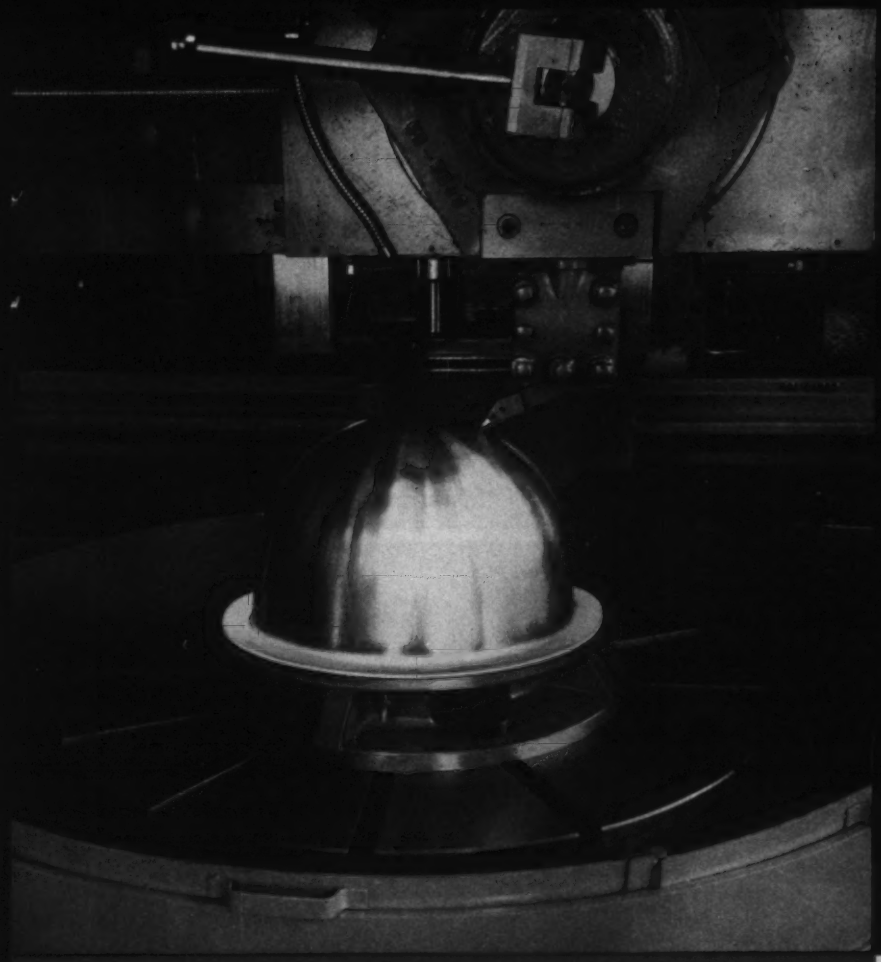
When our census people learn of new company formations, and there is reason to suspect they are in metalworking, querying is begun. Nonrespondents are followed up through the facilities of several independent research organizations in addition to checks by our census staff.

The result is more than a sample census and more than a compilation of plants that receive STEEL. It covers all U. S. metalworking plants employing 20 or more persons. An IBM card showing detailed information is on file for each of the 30,000 plants.

Miss Norma Mitcheltree, supervisor of the Tabulating Dept., breaks down a group of census cards

Why only those with 20 or more employees? As in most other industries, a relatively small percentage of the metalworking plants accounts for a large percentage of the business volume in the industry. At the last count, the group with 20 or more employees represented 96.1 per cent of the business potential in the entire industry. We figure that's pretty good coverage.

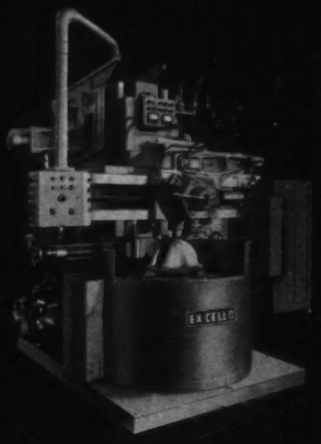
We'll return next week with more about our census. Hold the phone.



XLO

EX-CELL-O FOR PRECISION

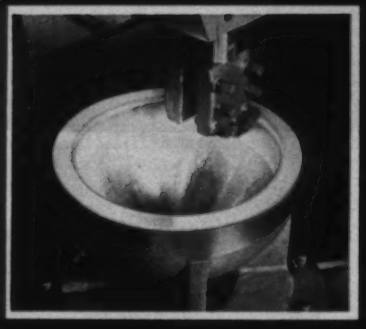
LEFT: Single tracer-controlled tool contours aluminum forging to .080" wall thickness holding .001" tolerance inside and outside.



ABOVE: Compact Vertical Contouring Machine handles medium or large workpieces. Slim cabinet at right side holds electronic tracer controls.

Critical Contour Tolerances?

HOLDS WITHIN .001" OF TRUE CONTOUR—INSIDE AND OUT



Close-up shows Style 416 contouring the inside surface. Workpiece is held in a vacuum fixture mounted on the machine table.

58-7

Contouring within .001" of true contour—inside and out—*without waste* requires the kind of precision built into an Ex-Cell-O Style 416 Vertical Contouring Machine.

The aluminum forging illustrated was first contoured on its periphery with a single electronic-tracer-controlled tool, then precision-finished inside to .080" wall thickness.

Designed for contouring hemispherical or irregularly-shaped surfaces, Ex-Cell-O Style 416 Machines also face, bore, turn, groove and chamfer with automatic cycling between loading and unloading.

Call your local Ex-Cell-O Representative, or write directly to Ex-Cell-O for information on other Precision Vertical Boring Machines.

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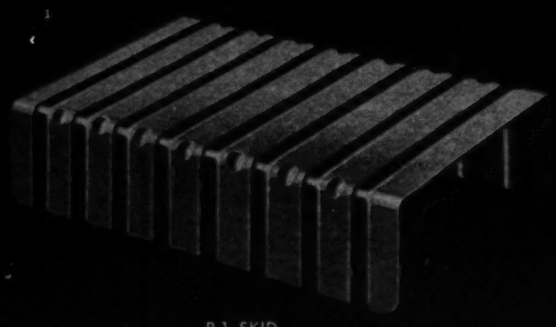
REPUBLIC SKID UNITS SAVE TIME, MONEY, SPACE IN HANDLING HOT FORGINGS AT PARK DROP FORGE COMPANY, CLEVELAND, OHIO

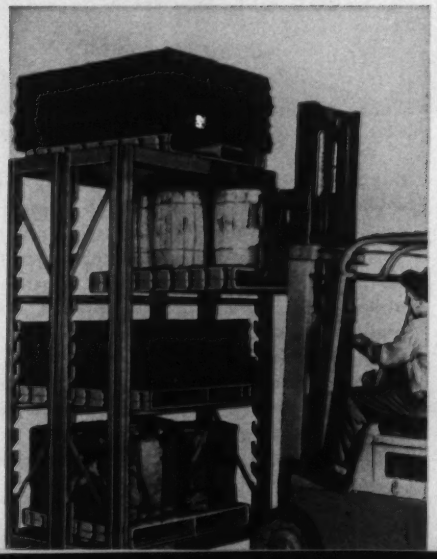


P-1 SKID

P-135 BAR CARRIER

REPUBLIC METAL LUMBER® solves framing problems fast! Simply measure, cut, and assemble with ordinary bolt and nut fasteners. It's the ideal material for constructing tailor-made storage facilities for hard-to-handle stock-and-store raw materials, industrial, and warehouse products. Available in two gages, two widths, in standard bundles of either 10- or 12-foot lengths. Order from your Republic-Berger warehouse. Send coupon for more information.

REPUBLIC PALLET RACKS simplify palletizing and stacking, save space. It is easy to stack and store bulky, uneven, odd-lot, and fragile materials. Tubular steel supports adjust every six inches to handle palletized material of any height. You can select pallets from any level. Two-way entry permits loading and unloading from either side. Send coupon for specifications.



Republic Materials Handling Equipment is designed and built to handle heavy weights in heavy-duty service. Park Drop Forge Company, Cleveland, Ohio, pioneer in the forging industry, has been using Republic Skid Units for some time.

Forgings, still very hot, weighing up to 3,500 lbs., are placed two on a skid and stored in the yard for cooling before shipment. Nearly 7,000 lbs. of hot metal is punishment for any skid, but Republic Skid Units withstand this severe service year after year.

Republic Skid Units are made from highest quality steel and feature reinforced corrugated design for extra strength. Lifting lugs, stacking brackets, special fork entries, can be added for adapting basic Republic Skid Units to your particular operations.

Let Republic Materials Handling Engineers work with you in planning practical and economical ways of using basic Republic Units in solving materials handling and containerization problems. Call your Republic representative, or write direct.

REPUBLIC CAN DO IT FOR YOU with complete sheet steel fabrication facilities. Contract manufacturing is a full-time operation at Republic's Berger Division. Engineers work with you in developing your product, and in solving manufacturing, assembly, and delivery problems. Well rounded stock of tools, dies, and a complete machine shop. Modern production lines for shearing, punching, forming, and painting. To learn more about Republic-Berger contract facilities, call or write today.

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Please send additional information on the following:

- ☐ Republic Materials Handling Engineering Service
- ☐ Republic Skid Units
- ☐ Pallet Racks
- ☐ Republic METAL LUMBER
- ☐ Contract Facilities

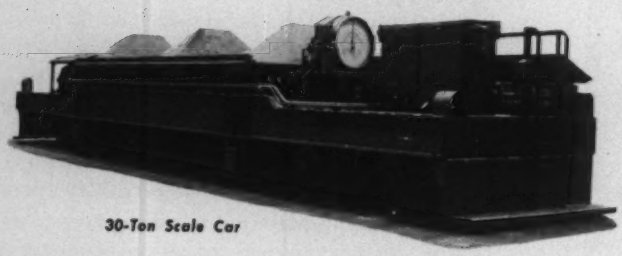
Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

Which Counts Most?



30-Ton Scale Car

Cost . . . performance . . . safety features? Usually it's all these, plus the solution of individual load and schedule requirements.

Atlas' 63 years of custom engineering, coupled with matching care in manufacturing, is your assurance of dependable service.

Since 1896 designers and builders of Scale Charging Cars . . . Ore Transfers . . . Coke Quenchers . . . Coal Larries . . . Door Machines . . . Safety-Type Transfers . . . Battery Locomotives . . .

ATLAS CAR & MFG. COMPANY

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CLEVELAND 10, OHIO

CALENDAR
OF MEETINGS

Mar. 14-18, National Association of Corrosion Engineers: National conference and corrosion show, Memorial Auditorium, Dallas. Association's address: 1061 M&M Bldg., Houston 2, Tex. Executive secretary: T. J. Hull.

Mar. 14-18, National Association of Manufacturers: Institute on Industrial Relations, Hollywood Beach Hotel, Hollywood, Fla. Association's address: 2 E. 48th St., New York 17, N. Y. Executive vice president: Charles R. Sligh Jr.

Mar. 15-17, Society of Automotive Engineers Inc.: National automobile meeting, Sheraton-Cadillac Hotel, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Mar. 16-18, Electronic Industries Association: Spring meeting, Statler-Hilton Hotel, Washington. Association's address: 1721 DeSales St. N.W., Washington 6, D. C. Secretary: James D. Secrest.

Mar. 17, National Industrial Conference Board Inc.: General session for all associates, Somerset Hotel, Boston. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Mar. 21-23, American Management Association: Special manufacturing conference, LaSalle Hotel, Chicago. Association's address: 1515 Broadway, New York 36, N. Y.

Mar. 22-24, Society of Automotive Engineers Inc.: National production meeting, Statler-Hilton Hotel, Cleveland. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Mar. 23-24, Instrument Society of America: Annual Iron & Steel Conference, Pick-Roosevelt Hotel, Pittsburgh. Information: R. E. Blackwell, Box 1346, Pittsburgh 30, Pa.

Mar. 23-25, Pressed Metal Institute: Spring technical meeting, Carter Hotel, Cleveland. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold A. Daschner.

Mar. 27-31, Scientific Apparatus Makers Association: Annual meeting. Boca Raton Hotel & Club, Boca Raton, Fla. Association's address: 30 N. Wacker Dr., Chicago 6, Ill. Executive vice president: Kenneth Andersen.

Mar. 28-29, Material Handling Institute Inc.: Spring meeting, Pittsburgh-Hilton Hotel, Pittsburgh. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

SAGINAW ball/bearing SCREW

A rugged Saginaw Ball Bearing Screw is used to raise and lower the new "Jetway" passenger loading corridor, manufactured by P I Steel Corporation in Los Angeles. It's now in operation for United Air Lines at San Francisco and New York's Idlewild Airport. These movable, telescoping corridors directly connect terminal and aircraft. Travelers pass through, protected from wind, rain, fumes and noise.

The Saginaw b/b Screw used here is a standard rolled thread assembly with a B.C.D. of three inches and measuring seven feet in length. The Saginaw Screw is in a motor-driven shaft under the outboard section of the "Jetway" . . . and in seconds, smoothly and accurately matches the floor elevation of the huge corridor to that of the plane.

Airlines specifically avoided hydraulic elevating systems—the Saginaw b/b Screw was selected because it converts *rotary* motion into *linear* motion with *over 90% efficiency*, plus contributing important savings in maintenance and power and providing noise-free operation. The Saginaw b/b Screw may bring these and other profitable benefits to *your* product, too. Details are yours by phoning or writing Saginaw Steering Gear Division, General Motors Corporation, Saginaw, Michigan—*world's largest producers of b/b screws and splines.*

Lifts giant "TRAVELING" corridor

Actuation To Fit Your Individual Requirements

Have been built as small as 3/16 in B.C.D. and 1½ in. long, as large as 6 in. B.C.D. and 40 ft. long. Larger sizes can be built to your order.

Saginaw ball bearing Screw

WORLD'S MOST EFFICIENT ACTUATION DEVICE

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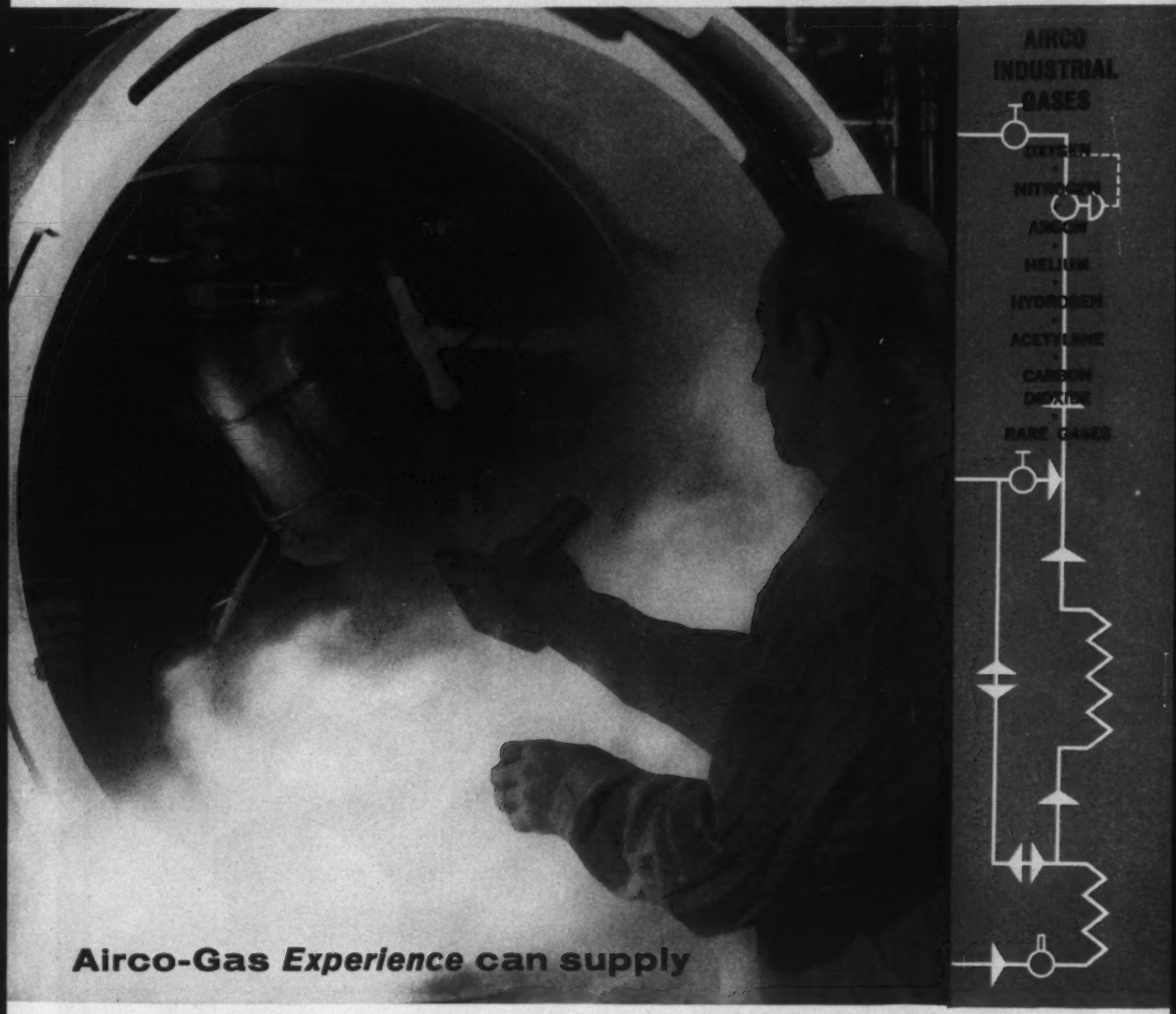
WASHBURN WIRE COMPANY, NEW YORK CITY

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

A missile component is being tested here at minus 300°F in an atmosphere of Airco nitrogen. An environment has been created — by an Airco gas — that is as rugged as ultimately the missile itself will find.



Airco-Gas *Experience* can supply

unusual environments, such as minus 300°F

Want unusually low temperatures for testing, treating or storing? Airco nitrogen gas—as low as minus 320°F — is what you are looking for. And if your requirements go just the other way — if you need over six thousand degrees for welding or cutting — there, too, Airco gases will serve you.

Yes, for any industry . . . and for any requirement, Airco Industrial Gases — backed by Airco's experience—are at your service. For information, call your nearest Airco office.

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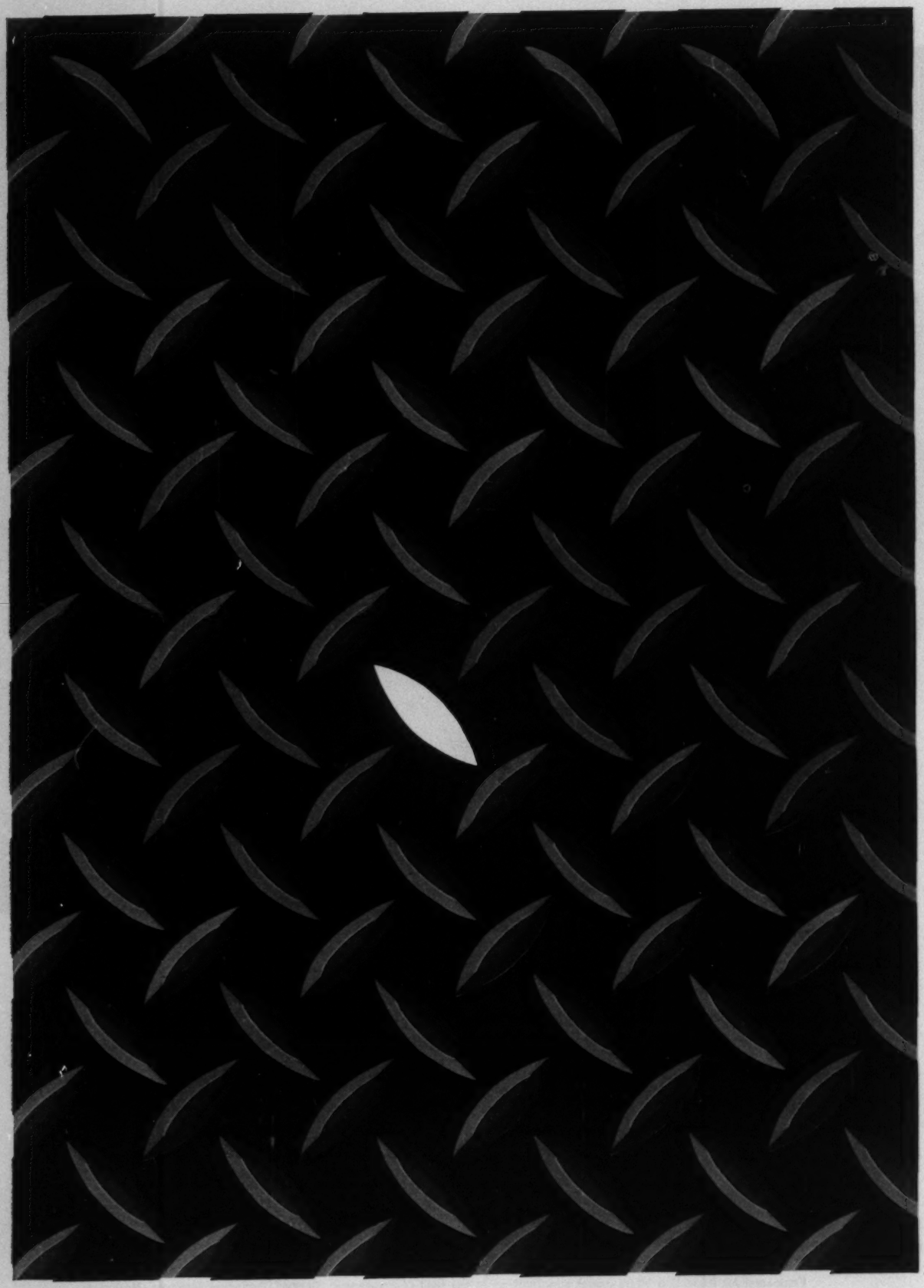

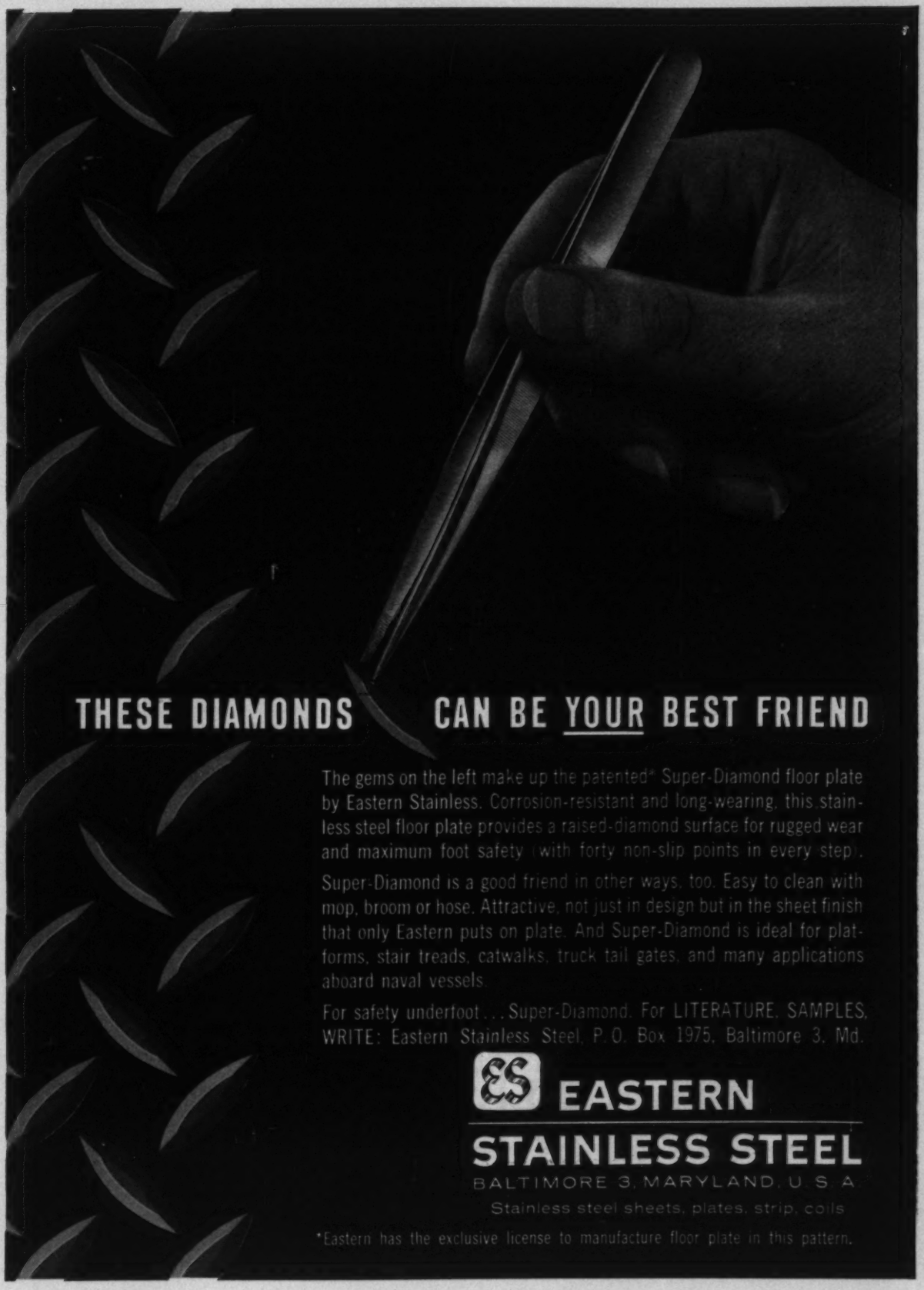

THESE DIAMONDS CAN BE YOUR BEST FRIEND

The gems on the left make up the patented* Super-Diamond floor plate by Eastern Stainless. Corrosion-resistant and long-wearing, this stainless steel floor plate provides a raised-diamond surface for rugged wear and maximum foot safety (with forty non-slip points in every step).

Super-Diamond is a good friend in other ways, too. Easy to clean with mop, broom or hose. Attractive, not just in design but in the sheet finish that only Eastern puts on plate. And Super-Diamond is ideal for platforms, stair treads, catwalks, truck tail gates, and many applications aboard naval vessels.

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Stainless steel sheets, plates, strip, coils

*Eastern has the exclusive license to manufacture floor plate in this pattern.

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Memo to a Man of "Parts"

The number of different parts made from Roebling High Carbon Specialties, Flat Wire and Spring Steel are close to countless.

Some things you can count on, though, are the consistent dimensional and mechanical uniformity you get with any Roebling High Carbon Specialty. They are the qualities that contribute to speeding *your* production and cutting *your* costs.

They are high qualities that make for high values. Next time you need flat wire or spring steel, specify Roebling. For information, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, N. J.

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Roebling... Your Product is Better for it

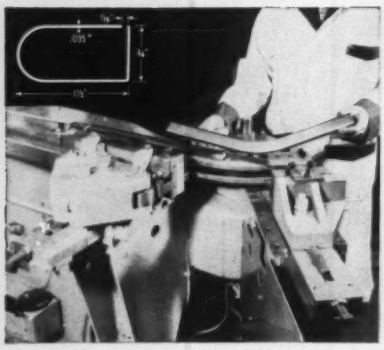
HIGHCHAIR SIDE FRAMES—formed on this PINES Model 3-T Bending Press at speeds up to 1000 bends an hour. Bends are made progressively with angles accurately controlled by the automatic angle-of-bend selector, and plane and location of bend determined by the system of stop gauges.

A DIFFICULT ALUMINUM EXTRUSION BEND—Preventing distortion and warping was difficult in making this 90° bend in 6063-T6 aluminum on a 9⅜" inside radius. A split-type bending die and link mandrel, on a Model 2 machine, produced wrinkle-free bends with no distortion.

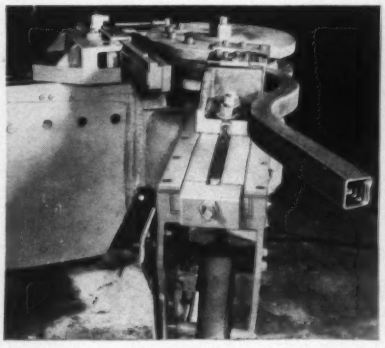
COLD BENDING
THE PINES WAY
Can Help You Remain Competitive

• High-quality bends at high speed is the key to a favorable competitive position in the fabrication of extrusions, tubing, pipe, or rolled sections. And the PINES WAY of bending is the key to quality and speed. It includes superior design, tooling to suit the job, provisions for quick setup, and competent service.

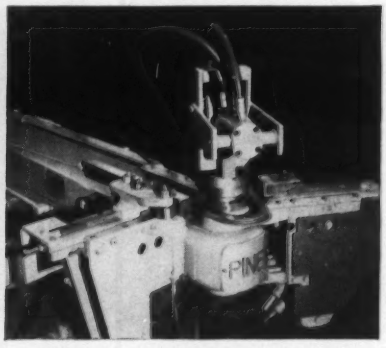
Some examples of the results of these factors are illustrated here. Whatever your metal-forming needs may be, it will pay you to investigate bending the PINES WAY. For assistance on your jobs or a cost analysis, call on Pines without obligation.



D-SHAPED STEEL CHANNEL—Unique tooling permits edge-bending without closing the ¼" slot. 37° bends are made on a 9" inside radius to form side rails for playground slides. Done on a Model 1¼ Bender.



SQUARE-TUBE VEHICLE FRAMES—Bending of SAE 4140 steel tubing, 3" square x .239" wall on 10½" radius is done on this Model 4 Bender. Tooling illustrates use of compound die for clamping on bent section.



FLAT STEEL BARS—Three ¾" x 1" bars are bent in one operation to 160° on this Model 1 Bender. A split die actuator opens the dies for easy removal of the pieces. Bends are smooth and wrinkle-free.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

662 WALNUT • AURORA, ILLINOIS

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For news about rotary and press-type machines, tooling, etc., write for copies of PINES NEWS. Catalog also available.

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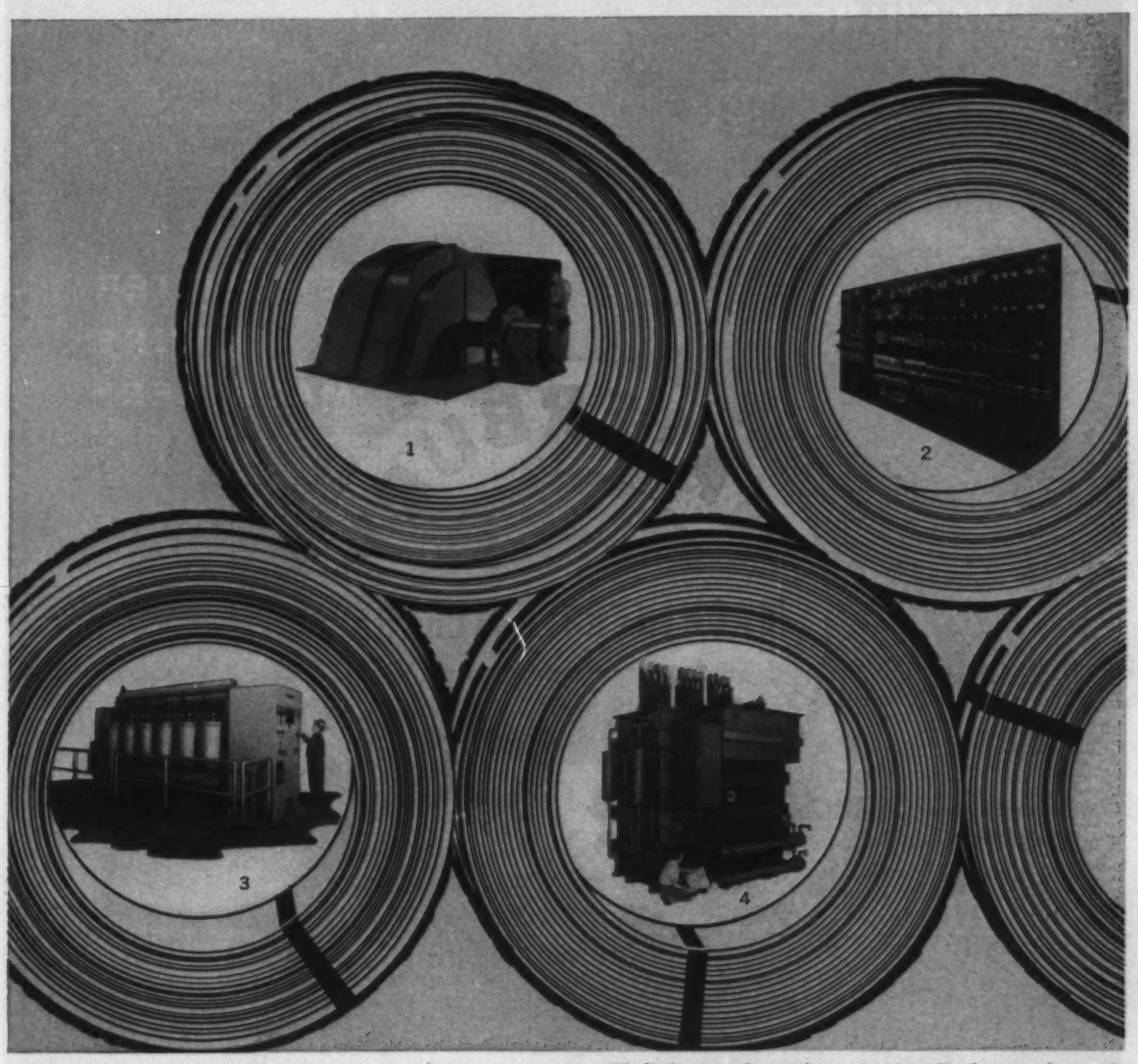

Allis-Chalmers equipment for progressive mills: 1. motor, 2. control, 3. mercury-arc and semi-conductor rectifiers, 4. furnace transformers.

The right start for better end results

begins with Allis-Chalmers electrical equipment coordination

Proper application . . . efficient use of electric power — these are essential ingredients to peak mill output. No single piece of equipment in a process line can guarantee this result, for its performance depends on the accurate function of other devices.

Allis-Chalmers equipment is matched to mill standards for maximum performance. Blooming mills, hot-strip mills — wherever electric power is used, Allis-Chalmers coordinated engineering is the key to higher efficiencies . . . increased yield . . . a finished product of the highest quality.

Allis-Chalmers is helping steel mills with their new plant and modernization programs. Many have improved output and product quality without the cost of major plant alterations.

There's an Allis-Chalmers steel mill specialist near you. *Call him direct, or write* ***Allis-Chalmers,*** *Industrial Equipment Division, Milwaukee 1, Wis.* A-1272

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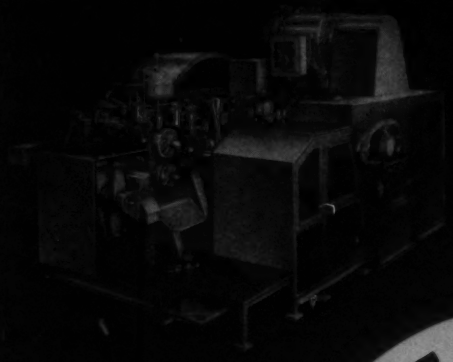
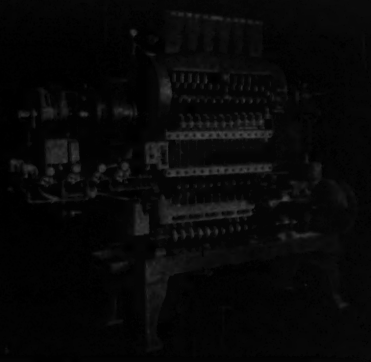
MACHINERY





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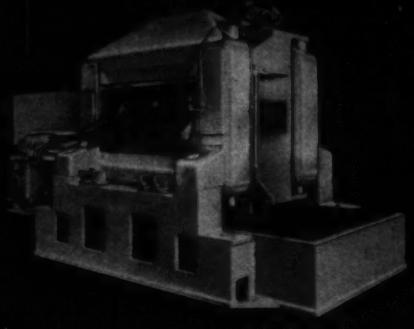

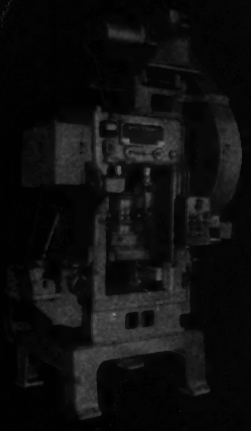

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PRESSES

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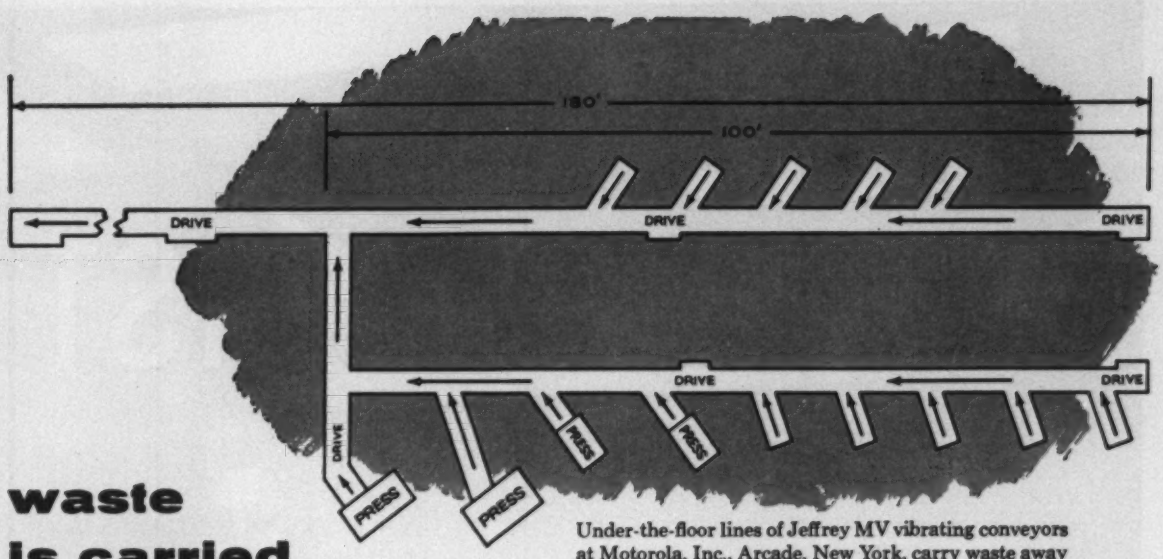
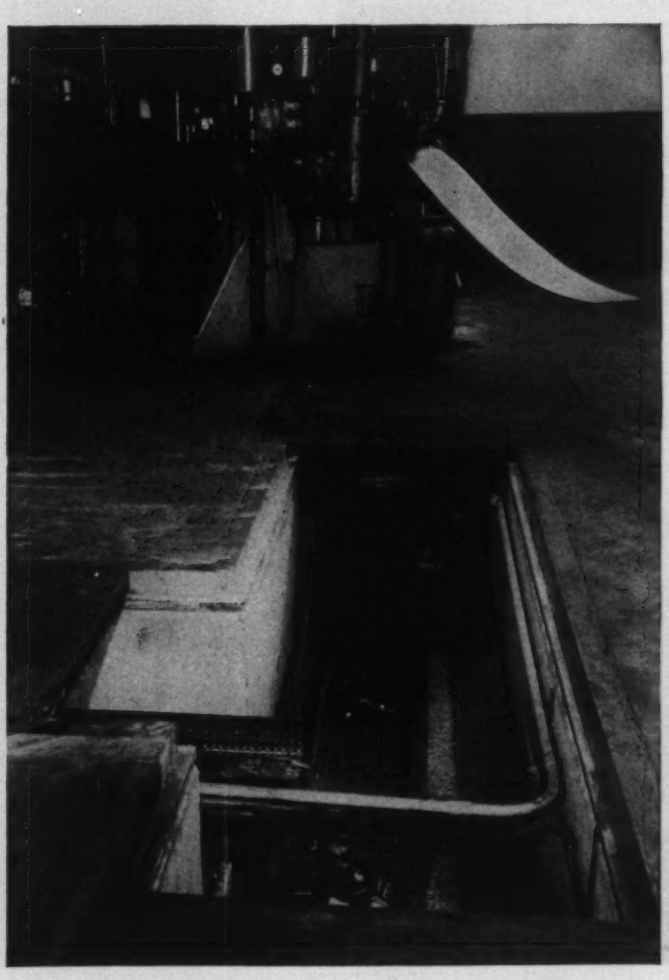


Under-the-floor lines of Jeffrey MV vibrating conveyors at Motorola, Inc., Arcade, New York, carry waste away from the punch presses as fast as it is produced. Engineered by Conveyor Systems, Inc. of Chicago.

waste is carried along smoothly, quietly on the JEFFREY MV CONVEYORS



MOTOROLA's punch press department, with its fourteen busy presses, is kept neat at all times. Metal trimmings and punchings from the presses fall directly through chutes onto Jeffrey vibrating conveyors below the floor. These keep this waste moving toward the end of the building, where a bucket elevator lifts it to an overhead bin, to be hauled away.

Jeffrey MV conveyors move material *fast*, lifting it from the deck with a rapid forward motion; no sliding action to cause wear. They are simple in design, dependable in operation and rugged in construction, so they're economical to operate and low on upkeep.

Bulletins describing Jeffrey mechanical conveyors of all capacities—light, medium and heavy—are available. For copies, write The Jeffrey Manufacturing Company, 889 North Fourth St., Columbus 16, Ohio.

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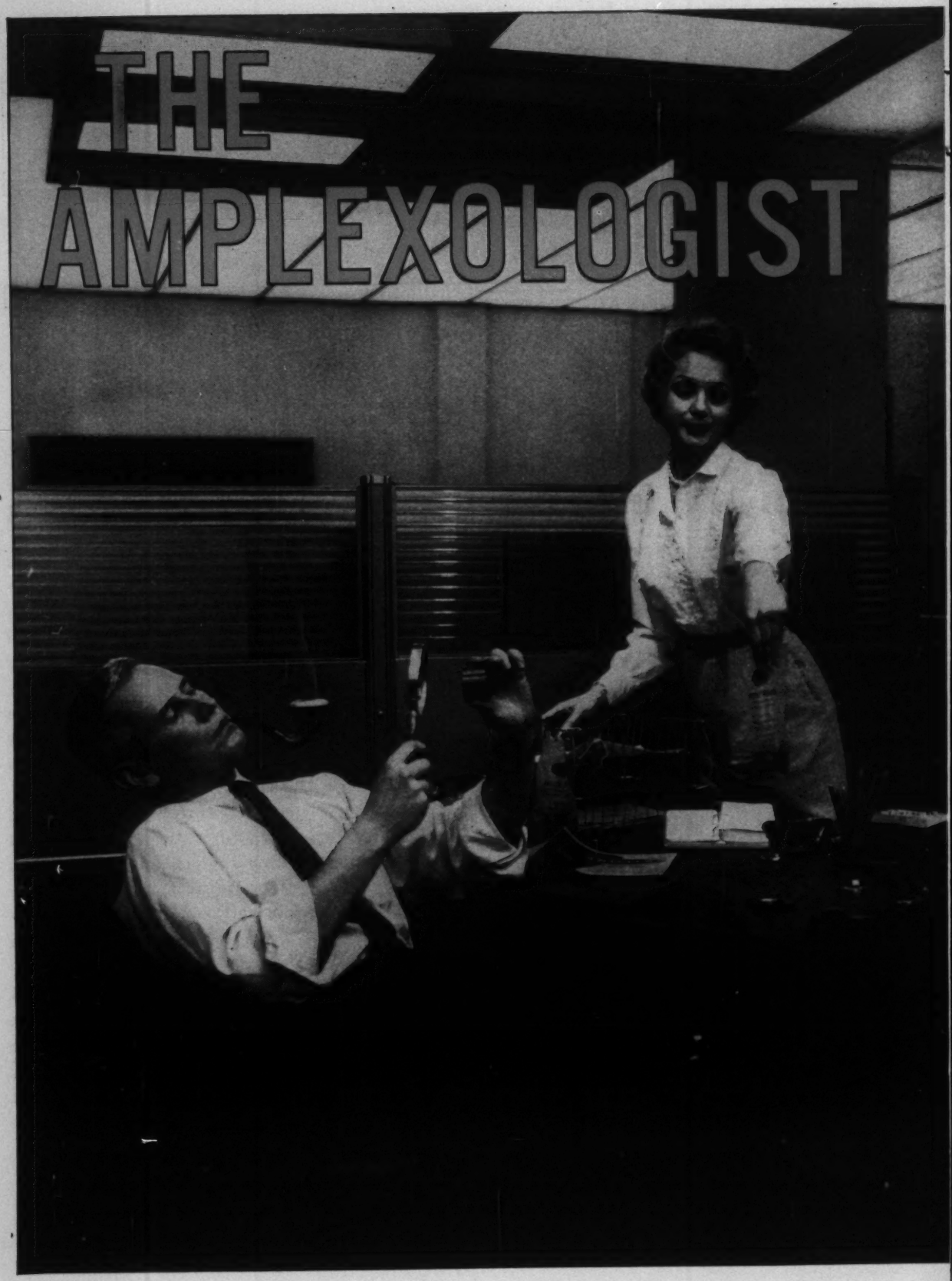
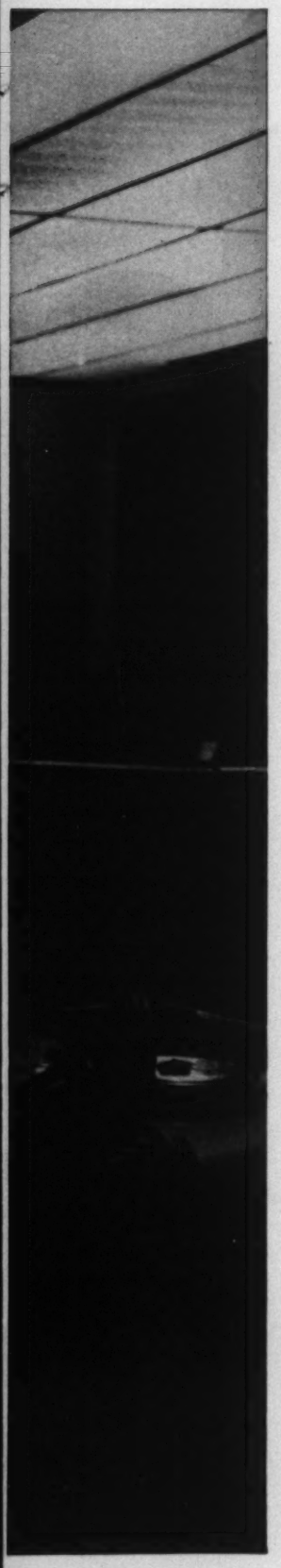

THE
AMPLEXOLOGIST



The Amplexologist spends a lot of time with his feet on his desk. Sometimes, usually when the boss is looking—he reads the Amplex engineering manual. But most of the time he just ponders parts. Parts that work in the kind of product your company probably manufactures (from eggbeaters to farm combines). He figures how to make them better and cheaper through advanced powder metallurgy—his specialty. (In fact, that's what makes him an Amplexologist.)

Whenever he can replace a conventional machined part with a finished, precision powder metal part that requires no machining—a little flame of joy leaps up inside of him. Since he's good at his job, this happens rather often—which accounts for the frequent smile on his face. And on ours, too. Because he has helped make us the world's largest and most experienced producer of powder metal parts—which is pleasant, sometimes.

More important, he's the reason so many leading manufacturers say: **When it comes to powder metallurgy—Amplex has the answer.**

AMPLEXOLOGIST

SEND COUPON...**If you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.**

AMPLEX DIVISION
CHRYSLER CORP. • DETROIT 31, MICH.

Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

NAME_____

COMPANY_____

ADDRESS_____

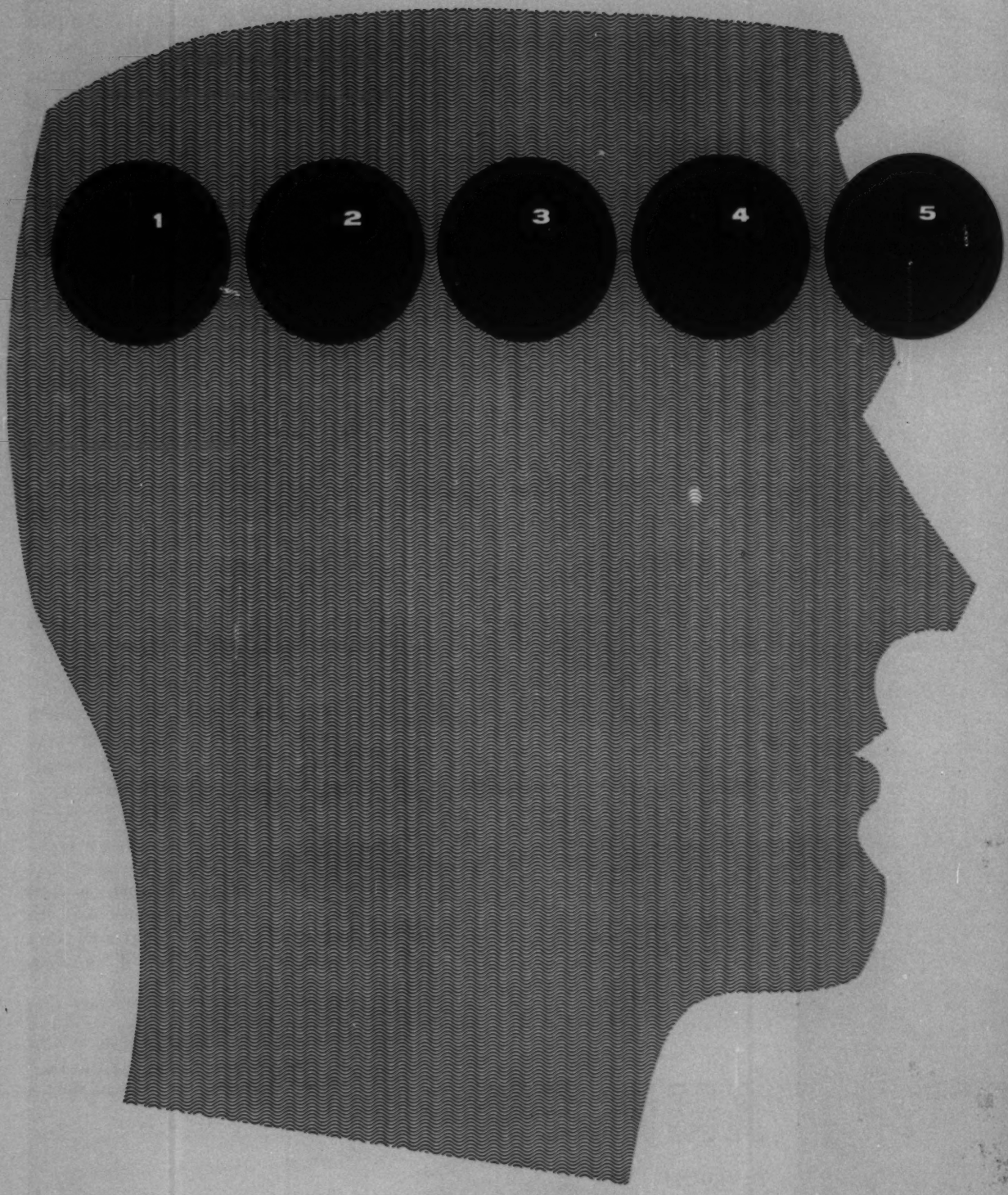
CITY_____ STATE_____

PRODUCT_____

AMPLEX

DIVISION CHRYSLER CORP.

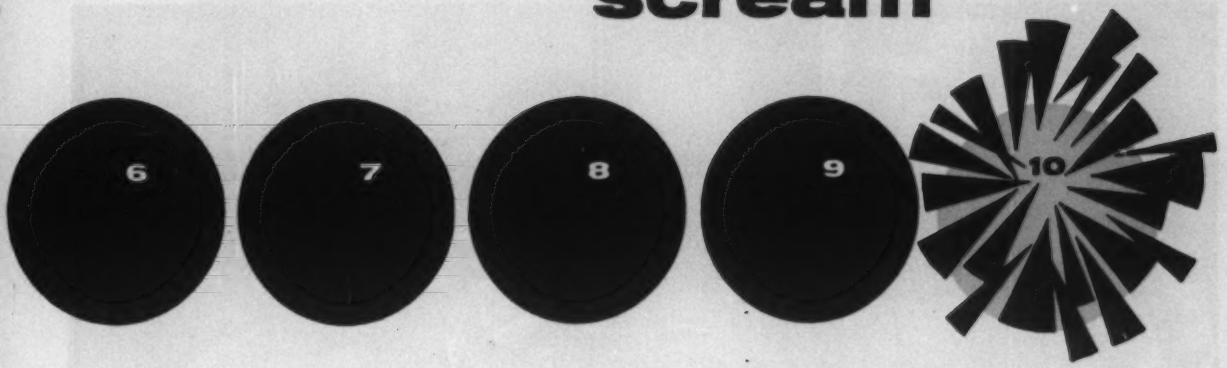
A CHRYSLER OILITE PRODUCT


1
2
3
4
5

count to ten . . .

and then

scream



That shipment of high temperature alloys hits your receiving dock. Everything goes great. No production headaches. No kicks from the field. Your wife looks several years younger and the dog doesn't growl at you any more.

You reorder from the same company. Still no problems . . . except you can't stop smiling while you shave. All told, you get nine separate shipments from this source. You're beginning to think high temperature alloy problems are the fantasies of fools.

So you place order number ten. Same supplier. Same grade. Same everything . . . except *this* lot fails to get by the eagle eye of your inspector. You've got a real procurement problem. Schedules suffer. Now your wife looks twenty years older and the dog snaps at your heels and you would trade your favorite putter for a high temperature alloy you can count on.

Carpenter hasn't come up with a cure for all your woes, but we have perfected a revolutionary new steelmaking process which minimizes variations from lot to lot. Called the MEL-TROL® process, it features a patented mold which reduces segregation of harmful impurities during solidification of the ingot. Result: you get clean, sound, tough metal from surface to centerline . . . in every bar . . . every time you order.

Now predictable performance is yours for the asking.

tool and die steels
stainless steels
electronic, magnetic and electrical alloys
high temperature alloys
special-purpose steels
tubing and pipe
fine wire specialties

Carpenter steel

a new company 70 years old

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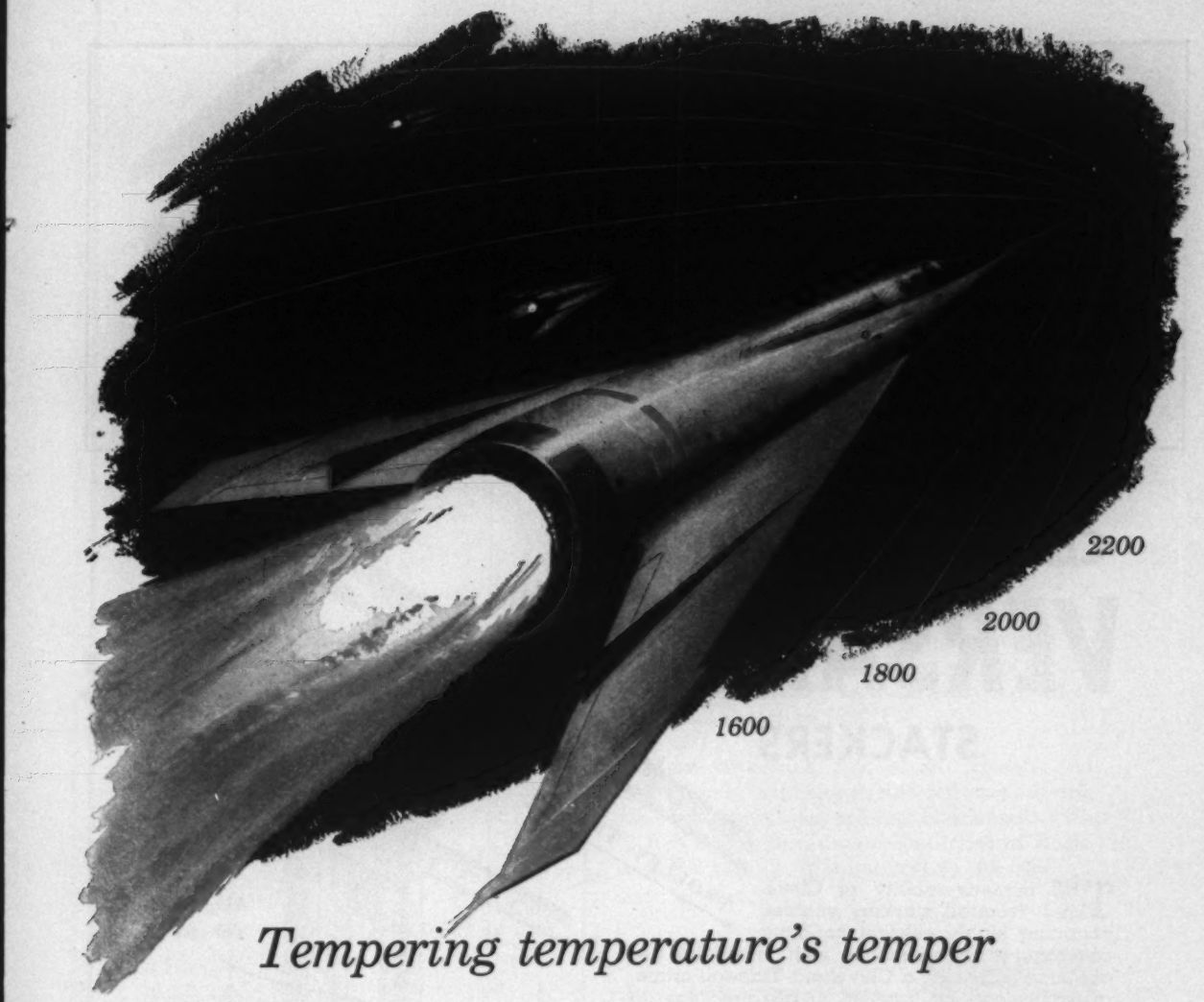
"Around here, good manpower's as plentiful as good fishing!"

A plant in Virginia's Shenandoah Valley pays profits in production . . . and dividends in pleasant living. For this resource-rich area is rich, too, in home-grown manpower. And you live in a vacation land where you can hook a bass or play a round of golf between closing time and dinner time, during the Shenandoah Valley's delightfully long season for out-of-door fun. ■ Ask VEPCO about the friendly community and governmental climate and many other plus factors that have attracted nationally known industrial giants to the Valley, and created successful home grown industries, too. For facts and complete, confidential site finding help, write, wire or phone VEPCO today.

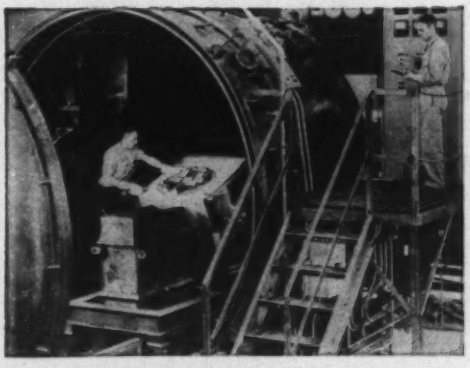
VEPCO **VIRGINIA ELECTRIC and POWER COMPANY**

Clark P. Spellman, Manager—Area Development, Electric Building, Richmond 9, Virginia • MIlton 9-1411

SERVING THE TOP-OF-THE-SOUTH WITH 1,990,000 KILOWATTS — DUE TO REACH 2,580,000 KILOWATTS BY 1962



Tempering temperature's temper



Complete vacuum melting equipment is part of HAYNES STELLITE's modern plant facilities. For full details, write for 48-page descriptive booklet.

Heat of 2000+ deg. F. is generated in a supersonic jet's tailpipe. So is extreme vibration.

By far the best alloy tested for this critical component is MULTIMET alloy—one of 12 HAYNES alloys helping combat heat, stress, and erosion in the jet engine, missile, and rocket field.

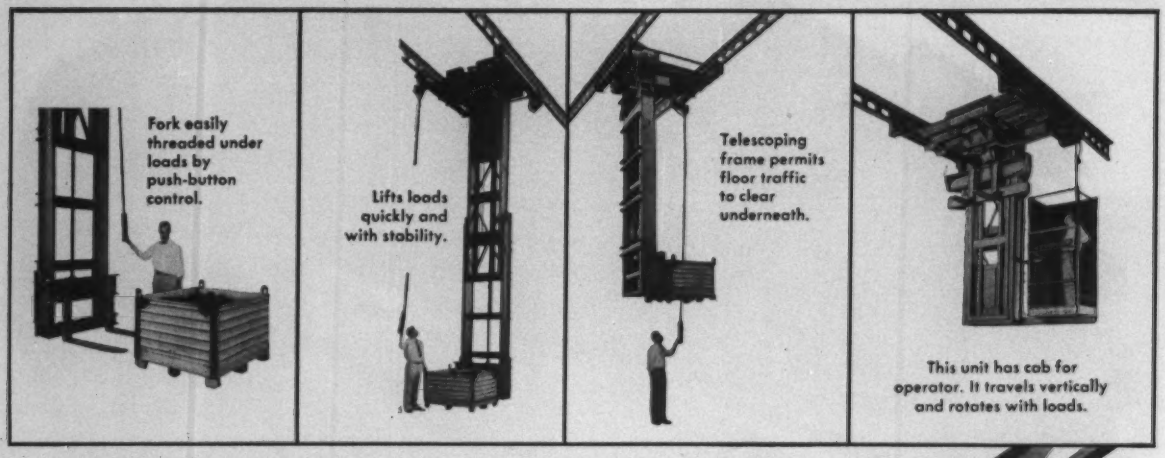
HAYNES alloys are relied on for use in afterburners, turbine blades, nozzle vanes, and many other high-temperature parts. All 12 HAYNES high-temperature alloys are *production* alloys and are readily available. Some are vacuum melted. Some air melted. Some are cast, some wrought, some are produced in both forms.

HAYNES
ALLOYS
HAYNES STELLITE COMPANY
Division of Union Carbide Corporation
Kokomo, Indiana

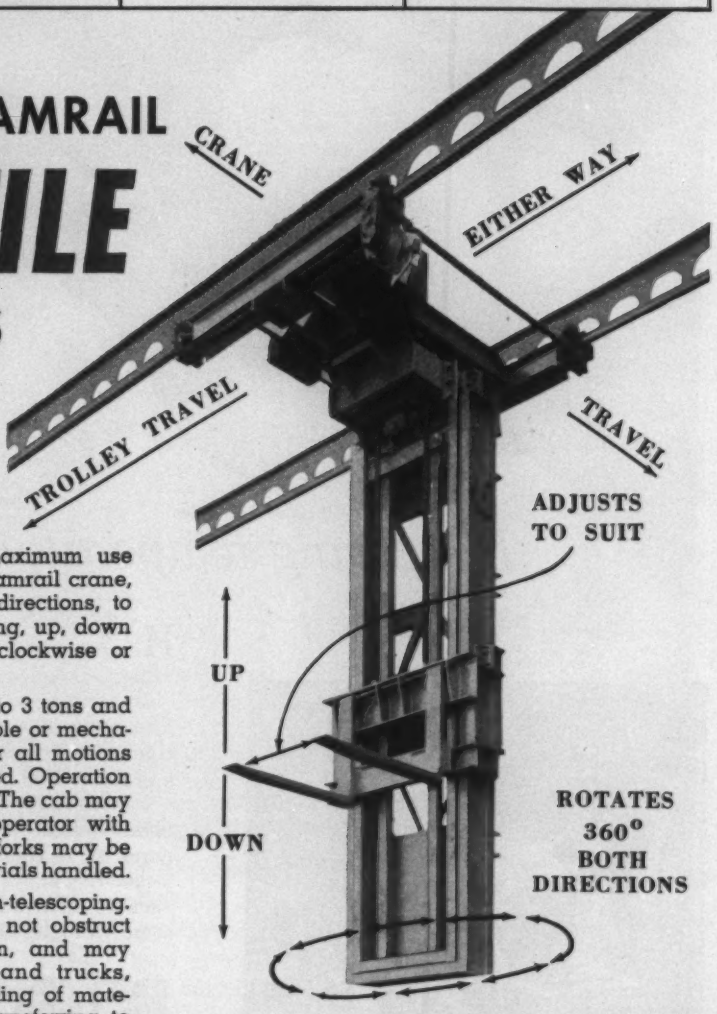
UNION CARBIDE

Address inquiries to Haynes Stellite Company, 420 Lexington Avenue, New York 17, N. Y.

"Haynes," "Multimet," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.


Fork easily threaded under loads by push-button control.
Lifts loads quickly and with stability.
Telescoping frame permits floor traffic to clear underneath.
This unit has cab for operator. It travels vertically and rotates with loads.

CLEVELAND TRAMRAIL
VERSATILE
STACKERS



THE maneuverability of Cleveland Tramrail stackers enables obtaining highly efficient handling coverage of a warehouse with maximum use of space. When on a Cleveland Tramrail crane, a stacker can be traveled in all directions, to front, rear or either side of a building, up, down and turned through a full circle clockwise or counter-clockwise.

Stackers are available for loads to 3 tons and lifts to 20 feet. They may be as simple or mechanized as the work requires. Any or all motions may be manually or power operated. Operation may be controlled from floor or cab. The cab may be traveled vertically to provide operator with maximum visibility of work. Lifting forks may be designed and spaced to suit the materials handled.

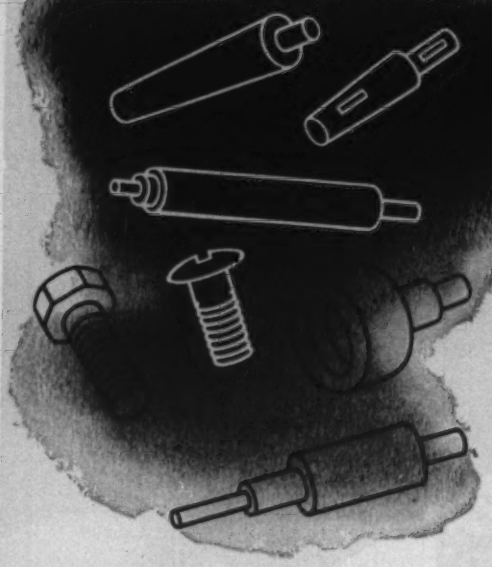
Design may be telescoping or non-telescoping. Telescoping type (illustrated) does not obstruct aisleways when in raised position, and may be traveled over railroad cars and trucks, thereby permitting the direct handling of materials to storage without need of transferring to other conveyances.

Cleveland Tramrail stackers and supporting cranes have much to offer. They can be designed to exactly suit your needs. Why not have a nearby Cleveland Tramrail engineer fill you in on the details.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7854 E. 290 ST. • WICKLIFFE, OHIO



Machine it! Put it to work!

Prehardened

VISCOUNT 44

High Strength Steel

No Further Heat Treatment Necessary!

Here's the high strength steel that cuts engineering and maintenance problems to the bone on maintenance and machine tool applications. Unexcelled strength, good toughness and increased wear resistance—these are the advantages of VISCOUNT 44, even when exposed to temperatures up to 1000°F.

More important, risk of size change and distortion of critically-engineered parts during heat treatment is completely eliminated. VISCOUNT 44 is furnished prehardened at Rockwell C 42-46 . . . it's practical to machine . . . easy to work!

NOMINAL ANALYSIS

Carbon	.40	Chromium	5.00
Silicon	1.00	Molybdenum	1.20
Manganese	.75	Vanadium	1.00

plus Alloy Sulphides

MECHANICAL PROPERTIES

Furnished Hardness	RC 42-46
Tensile Strength	180,000-220,000 psi
Yield Strength (0.2% offset)	160,000-200,000 psi
Reduction of Area	40-50%
Elongation, 2"	10-15%
Coefficient of Expansion 80-1000°F	7.0 x 10^{-6} inches/inch°F

Have a high strength steel problem? Call a Latrobe sales engineer today! Or, send for VISCOUNT 44 literature.

TYPICAL APPLICATIONS

Spindles • Shafts • Brake Dies • Forming Rolls • Tie Rods
Arbors • Axles • Bolts • Structurals • Cams

LATROBE Metalmasters

LATROBE STEEL COMPANY
LATROBE, PENNSYLVANIA

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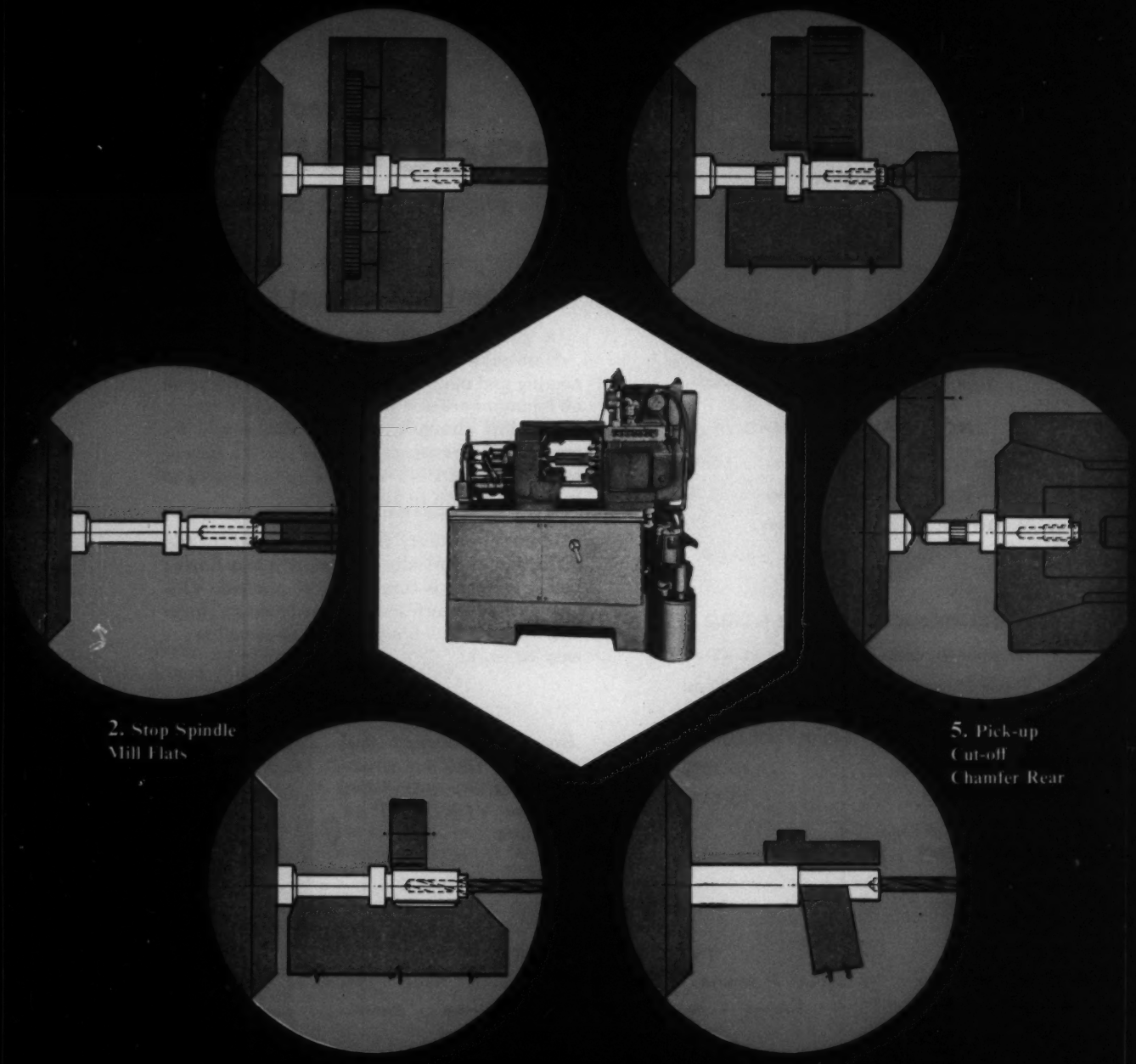
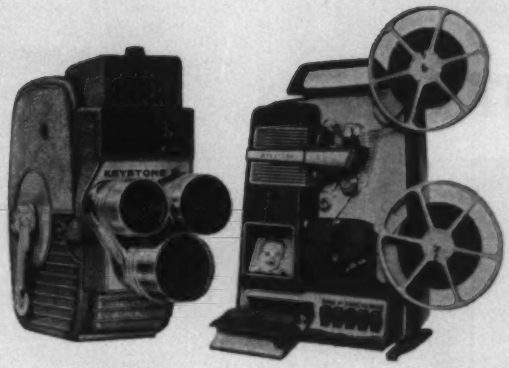


9 operations in 3.8 seconds . . . one of the typical parts produced by Keystone Mfg. Co. on the 7/16" RA-6 Bar Automatic



85,000 Pieces Per Day And No Rejects

Production *facts* tell a typically impressive story of Acme-Gridley machining efficiency at Keystone Manufacturing Company, Boston, Mass.

"We have five 7/16" RA-6 Spindle Bar Automatics", states a Keystone executive. "Everyday, they produce an average of 85,000 precision parts for our cameras and projectors . . . and yet, there are literally no rejects. As a result of this consistent conformance to our tough tolerances, scrap losses have been wiped out and inspection time reduced to an all time low. What's more, because Acme-Gridleys produce in a single set-up jobs otherwise requiring secondary machining, we've cut production costs."

Dramatic and *tangible* savings like those realized by Keystone are commonplace with Acme-Gridleys. Such features as a wide open tooling zone, direct camming and independently operated tool slides can help you achieve higher mass production efficiency at lower cost. We'll be happy to supply complete information on the world's most complete line of multiple and single-spindle automatic bar and chucking machines. Call, write or wire.

National Acme's "Zone of Responsibility" includes all phases of cost reduction
Check YOURS . . . Then Check National Acme

Direct Costs: these include direct dollar savings as realized by Keystone Manufacturing Co. . . . an "everyday" job for Acme-Gridleys. **Indirect Costs:** effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc. **Product Redesign:** teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities. **Direct Material Costs:** our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems. **Make-or-Buy Reviews:** in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment. **Spot Modernization:** pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.

National Acme

The National Acme Company
189 E. 131st Street
Cleveland 8, Ohio

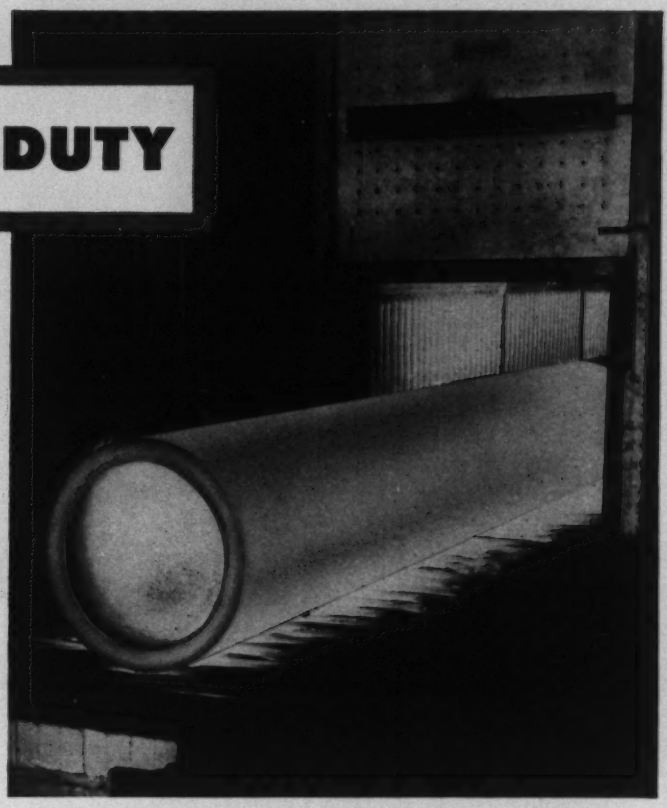
Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

MMT-PE

Ask HEVI-DUTY

Sandusky Foundry and Machine Company did...

and now heat treats centrifugal castings of carbon and alloy steel at controlled, uniform temperatures up to 2050° F. with a



Sandusky Foundry and Machine Co. selected this Hevi-Duty Electric Car Bottom Furnace, rated at 2050° F. for their heat treating requirements. Casting being heat treated here weighs 13,700 lbs.

HEVI-DUTY CAR BOTTOM FURNACE

When your heat treating applications demand *quality production at uniform controlled temperatures*, Hevi-Duty can supply either electric or fuel-fired furnaces to meet your requirements.

For example: At Sandusky Foundry and Machine Co., Sandusky, Ohio, centrifugal steel castings up to 50 inches in diameter by 33 feet in length have been heat treated in a Hevi-Duty Electric Car Bottom Furnace. This furnace provides accurately controlled temperatures to 2050° F. in its 6′ x 6′ x 34′ long chamber. They use it to normalize, temper and anneal steel and stainless steel castings. Parts are either air cooled or water quenched.

The Hevi-Duty Car Bottom Furnace features five zones of temperature control, and by placing a dividing wall between the three forward and two rear zones, two separate loads with different temperature ranges can be treated simultaneously. Heating elements in side and end walls, ceiling, door and car bottom, plus three removable air-circulating fans help provide uniformity of temperature.

Whatever your particular heat treating application, there's a Hevi-Duty furnace designed to do the job. Car Bottom Furnaces are available with many arrangements and optional features—single or double end, retort type, controlled atmosphere, forced-air convection and others. Be sure to contact Hevi-Duty first for your heat processing equipment needs.

HEVI-DUTY

A DIVISION OF BPC BASIC PRODUCTS CORPORATION

ASK HEVI-DUTY

for more information on electric or fuel-fired heat treating furnaces. Car Bottom Furnaces are fully described in Bulletin 644R.

HEVI-DUTY ELECTRIC COMPANY, MILWAUKEE 1, WISCONSIN

Industrial Furnaces and Ovens, Electric and Fuel • Laboratory Furnaces • Dry Type Transformers • Constant Current Regulators

HOW HEAVY A LOAD

can a ball bearing carry?

Federal Ball Bearings make light work of the heaviest loads. *Quiet* work, too. We use SAE 52100 steel and engineer extra stamina into every ball and raceway. Each bearing goes through scores of production and quality control steps because, frankly, we're terrible cranks about precision. We insist that you should be able to mount a ball bearing—and forget it.

Our customers seem to like this idea. And they include the most respected names in American industry. So, when you want to take a work load off your shoulders, put it on a Federal Ball Bearing. Our catalog lists over 12,000 ball bearing sizes, hundreds of types. Send for it.

THE FEDERAL BEARINGS CO., INC., Poughkeepsie, N. Y.

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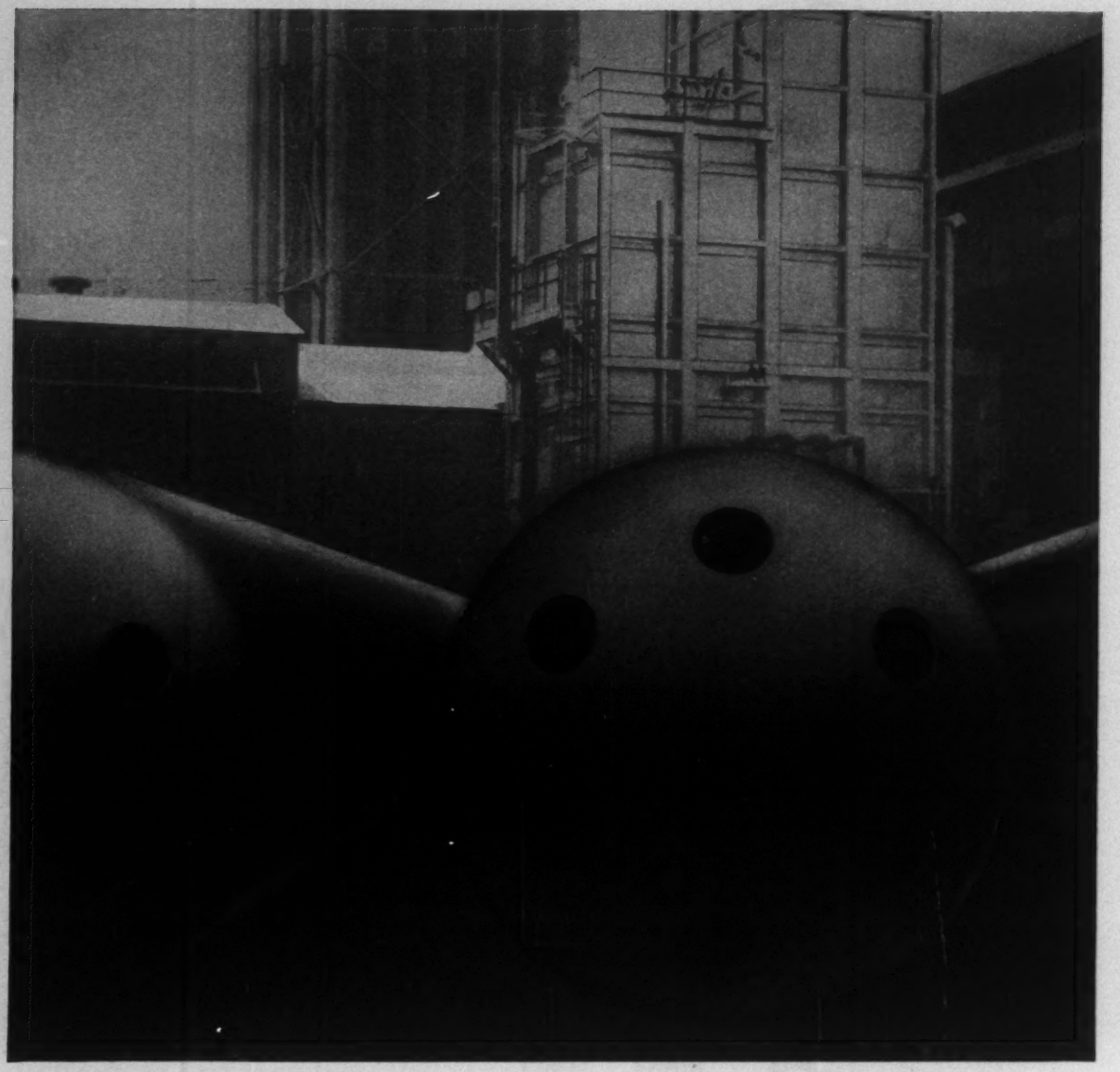
One of America's largest ball bearing manufacturers

FEDERAL ON FILM—A 16 mm. color sound film takes you through our 400,000 sq. ft. plant. Loaned free. Just ask for it.



AGAIN! Granite City Steel calls on Air Products for reliable, low-cost oxygen

A new Air Products facility will soon supply Granite City Steel Company with an additional 90 million cubic feet per month of high purity oxygen for open hearth roof lancing. Air Products on-site plants have been supplying Granite City with oxygen since 1950, with capacity reaching 60 million cubic feet per month in 1958. As in the past, the new capacity will be available at no capital investment to Granite City.

Behind this major expansion in oxygen supply lies a record of Air Products technical services . . . a period during which Air Products development engineers worked with Granite City around the clock on roof jet practices. Air Products roof jets, such as those shown above, have resulted in dramatic increases in open hearth production.

Progressive steel companies across the nation have found it profitable to make use of Air Products up-to-date technical services and experience in oxygen supply. Let's talk about how *you* can put Air Products oxygen to work. Air Products, Inc., Allentown, Pa.

Air Products
. . . INCORPORATED

style is stainless steel

Stainless Steel is the only surfacing material with a hard lustrous finish that is always in style, withstands exposure to all kinds of wear and has a low maintenance cost for the life of the building.

No other metal offers the freedom of design and fabrication, economy of care and the durable beauty that serves and sells like Stainless Steel.

McLOUTH STEEL CORPORATION, Detroit 17, Michigan

specify

McLOUTH STAINLESS STEEL

HIGH QUALITY SHEET AND STRIP

for architecture

Extruded section reduces material required 65% on this flash butt-welded missile part

By leaving 2/3 of the titanium required at the mill, dramatic savings were effected on this ram jet engine part used in the Bomarc.

Amweld quoted the job, suggesting a special extruded section shown here, and saved 19.8 lbs. of expensive titanium per ring. The flash butt-welded rings from extruded sections offered additional savings in machining time, since only a small amount of metal had to be removed.

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 110 DIETZ ROAD • WARREN, OHIO

House of the Future to Be Part of Garden, Use More Metal

The house you'll live in 10 to 15 years from now may have an outline that resembles a violin, a flower, a horseshoe, or most any shape you desire. And it'll contain considerably more metal and glass than the one you own now. The walls of your livingrooms and diningrooms may be glass from floor to roof. The roof may be a series of insulated aluminum panels (hexagons, octagons, triangles, squares) joined at their edges and supported by vinyl coated steel pillars. Coated metal room dividers 7 or 8 ft high may replace walls. For privacy, your lot might be surrounded by a thin, reinforced concrete wall. It'll be tough to tell where the garden stops and the home begins: Shrubbery will be an integral part of your room decor. Those are some of the concepts being discussed today as new materials and methods permit architects to use more imagination. A house employing many of those features was exhibited last week at the Cleveland Home & Flower Show. It was designed by architect John T. Kelly.

He's a Tough Competitor, but Good Customer Too

The man in this picture, who is paid considerably less than Americans doing the same kind of work, poses a tough problem of competition for many metalworking companies. But he can also be a good customer. Example: Yoder Co., Cleveland, is building a complete roll forming line (including piercing and cutoff stations) for export to Japan. It will be used to make guard rails for Japan's intensive highway program. Yoder is building another line for export to Japan that will be used to make roofdeck—entirely for Japanese consumption, says Yoder. H. E. Snyder, director of marketing, Arcos Corp., Philadelphia, says some foreign firms are so hungry for technical advancement that they often buy newly introduced equipment without having seen it. A Japanese firm just bought three Vertomatic welders that way, he reports.

Office Customs—1960

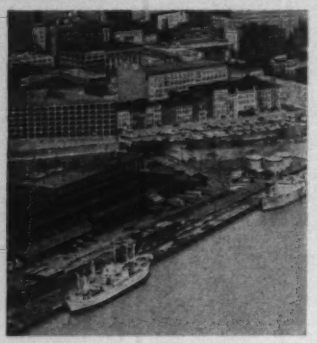
A new survey of 2300 firms by National Office Management Association finds these trends in office customs: 86 per cent of the companies hire married women with preschool children (61 per cent say such women are absent no more than other clerical employees) . . . 58 per cent permit an employee's spouse to work for the company . . . 89 per cent have no rules or restrictions on office dress . . . 73 per cent permit employees to receive personal telephone calls at all times . . . 40 per cent hold a summer picnic for office workers.

Plastics to Win More Packaging Jobs, Says GE Engineer

Plastics and paperboard are nearing a crossroad in price that has pocketbook implications for all makers of packaged products, R. H. Thomas, senior en-

gineer at General Electric's Packaging Laboratory told an American Management Association seminar. Corrugated board has more than doubled in price since 1941, while styrene has declined to corrugated's present price, he reports. Urethane cost has declined and probably will "cross the upward trend of corrugated this year or next," says Mr. Thomas. GE is concentrating on plastic packaging, but all is not rosy there either, says Mr. Thomas. Some venders of plastics are boosting profits by using more material than is needed to do a given job, he charges.

Seaway Gets Set for New Season



Operators of Great Lakes fleets are calling crews back and readying ships for what could be an early opening of lake shipping—despite last week's onslaught of bitter cold. The St. Lawrence Seaway Development Corp. has set Apr. 15 as the official opening date for navigation through the Wiley-Dondero Channel, Eisenhower and Snell Locks. It's expected the Welland Canal will be opened Apr. 1. Ore fleet firms hope to travel Lake Superior by Apr. 15.

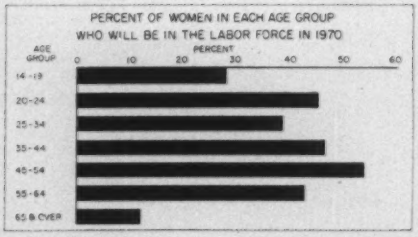
How Metalworking's '59 Profits Compare with Others

The First National City Bank of New York analyzed financial statements of 2404 corporations to find how 1959 net profits compare with those of 1958:

Industry	% Change	Industry	% Change
All industries	+20	Public utilities	+13
All manufacturing	+27	Class I railroads	− 5
Iron and steel	+ 5	Tires, rubber products	+26
Autos and parts	+94	Lumber, wood products	+33
Other transportation equip.	− 13	Cement, glass, stone	+27
Other metal products	+27	Chemical products	+32
Metal mining	+16	Paper, allied products	+20

Women Gain Stature in Industry

By 1970, there'll be about 30 million women workers in the U. S.—6 million more than today. It means the number of women workers will rise 25 per cent vs. a 15 per cent rate for men. One in three workers will be a woman, says the Labor Department.



Aluminum Industry Shows Build-It-Yourself House

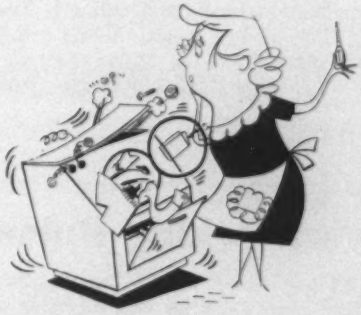
Two do-it-yourselfers can erect this five room, 1200 sq ft, aluminum cottage in five days, claims Aluminum Co. of America. It's made of interchangeable panels, faced with aluminum and insulated with styrofoam. The panels lock together like an Erector Set. The cottage pictured sells for about $5500. Two other models—priced at $3500 and $4700—are available from the manufacturer, Florida Industries, Tampa, Fla.

Highway Contractors Reap Production Efficiency

Since 1953, highway contractors have experienced a 33 per cent gain in labor costs, a 20 per cent increase in material costs, and a 24 per cent hike in equipment ownership costs—yet boosted their bid prices only 2.7 per cent. That's what Max C. Harrison of Harrison Construction Co., Pittsburgh, told the House Committee on Public Works. The key has been a rapid improvement in productivity. One construction industry official told STEEL last week that equipment builders have improved the efficiency of their products "more than enough to offset the increase in prices."

Hotpoint Introduces 'One Charge' Appliance Service

Hotpoint servicemen in 47 cities have received a job pricing manual that standardizes the costs of various replacements, repairs, and adjustments made on appliances. It permits them to quote accurate prices for servicing before the work is performed. Hotpoint officials believe the system will reduce customer complaints about service costs by 60 per cent. The manual lists charges ranging from $1.45 to $42.75, eliminates callback charges.

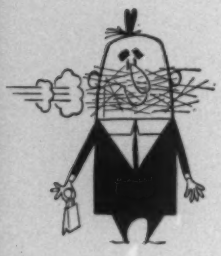


Keeping Engineers and Scientists Happy

Money isn't necessarily the best approach, says Dr. Lee Danielson, associate professor at University of Michigan. He suggests an option plan for your higher ranking engineers in nonmanagement groups. Many of them make enough money but lack the prestige of their management counterparts. Instead of a raise, why not give them a choice of other benefits—like memberships in technical societies or trips to association meetings? He

says the important thing is to make sure the choice is a reward for performance (not merely a routine prize for length of service).

Straws in the Wind



The long range committee established by the contract between Kaiser Steel Corp. and the USW held its first full meeting last week in New York . . . Chase Brass & Copper Co., Waterbury, Conn., a subsidiary of Kennecott Copper Corp., will build a $2 million, automatic tube rolling mill . . . The Cleveland Electric Illuminating Co. will spend $190 million on expansion during the next five years—$27 million of it this year . . . "There is scarcely a market for heat exchange that isn't in its early stages of development," says D. C. Minard, president, Trane Co. . . . Consumers stepped up installment buying in January (adding $393 million to debt) after a slowdown late last year, reports the Federal Reserve Board . . . Studebaker will produce and assemble cars and trucks in Australia: Initial annual target is 2400 car assemblies. Parts to be made there include springs, wheels, shock absorbers, tires, bumpers, radiators, batteries, exhaust pipes, mufflers, and trim . . . Dr. Hugh Keenleyside, chairman, British Columbia Power Commission, is leading a Canadian movement to abolish tariffs on some industrial goods—especially cars—shipped between the U. S. and Canada . . . Koppers Co. is expanding facilities to boost polystyrene output by 15 per cent . . . The Atomic Energy Commission is diverting $11 million from other projects to develop a nuclear powered rocket . . . AFL-CIO has set aside $100,000 for a campaign to organize farm workers.

Looking for Land?

The federal government has a lot of it—771.7 million acres, to be exact. It's valued at $49.2 billion in the latest inventory taken by General Services Administration. Of the 2,269.3 million acres comprising the U. S., the government owns 33.8 per cent. Largest landholder is the Department of the Interior with 552.8 million acres. Next come Agriculture (186.1 million acres) and Defense (29.4 million). The government owns more than half the acreage of five states: Alaska (99.1 per cent), Nevada (86.4 per cent), Utah (69.1 per cent), Idaho (64.2 per cent), and Oregon (51.2 per cent). It owns less than 1 per cent in six states: Connecticut, Iowa, Maine, Ohio, New York, and Kansas.

Metalworking Pulse

Steel: Record ingot production is being maintained. A new peak for February was set when output exceeded 11 million tons. The all-time monthly high was set in January: Over 12 million tons. **Autos:** Encouraged by February sales reports, automakers are scheduling March output at nearly the same daily rate as last month. **The Business Trend:** STEEL's industrial production index continues its gradual downtrend, but it's still only 9 points below the all-time high.

- **INDUSTRIAL PRODUCTION**
  - Week ended Mar. 5 . . . . 176†
  - Year ago 167
  - Details on Page 67
- **PASSENGER CAR PRODUCTION**
  - Week ended Mar. 12 . 148,000*
  - Year ago 134,283
  - Details on Page 61
- **INGOT PRODUCTION RATE**
  - Week ended Mar. 13 . 92.9%†
  - Week ago 92.8%
  - Details on Page 142

†Preliminary. *Estimated.

Only Carlson produces all plate thicknesses in all these superior grades of stainless steel

309
309S
309SCb
310
314
316
316L
317
317L
D319
D319L
17-4 PH*
17-7 PH*
PH 15-7 Mo*

IN addition to the more usual grades, Carlson regularly produces stainless steel plate and plate products in this wide range of superior analyses in any thickness. Many of these grades are included in our mill inventory; the others can be rolled to your order.

These chromium-nickel analyses were developed to more closely match the exact requirements of process, nuclear, and space equipment. Each has one or more of the following advantages: increased corrosion and/or heat resistance, good machinability, ease of fabrication, and exceptionally high physical properties with low temperature heat treatment. By selecting the grade that gives you the combination of advantages you want, your costs can be reduced and the trouble-free life of your equipment extended.

Write today for details on these superior grades and for inventory information on all types of stainless steel plates and heads.

*Trade marks of Armco Steel Corporation

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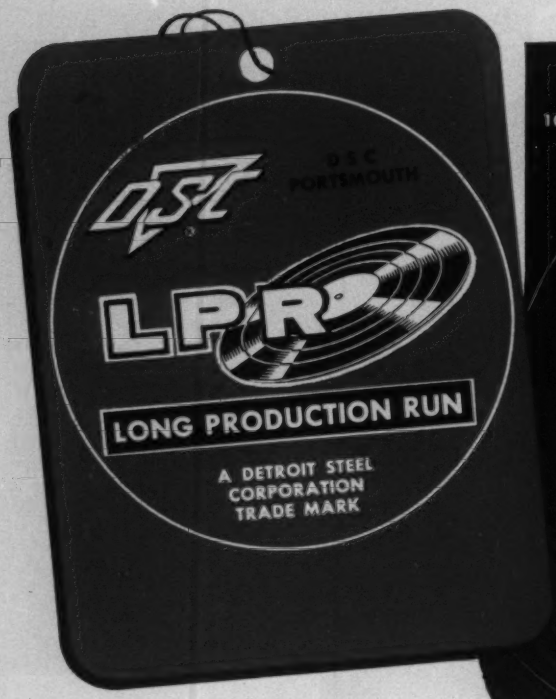
G.O.CARLSON Inc.

Stainless Steels Exclusively

122 Marshalton Road
THORNDALE, PENNSYLVANIA
District Sales Offices in Principal Cities

Plates • Plate Products • Heads • Rings • Circles • Flanges • Forgings • Bars and Sheets (No. 1 Finish)



This LPR Tag

on your Brite Wire coils means greater efficiency in your fabricating operations —at no added cost

Typical *LPR Savings as reported by Users (See Note)

- **Downtime frequency due to coil changes and setup adjustments cut as much as 95%.**
- **Cumulative coil-end scrap trimmed to the bone.**
- **Man-hour costs slashed (20% and more is common).**
- **Material handling time and expense substantially reduced. Unloading time alone cut from 16% to 50%.**
- **High density, self-supporting coils release 15% to 20% of storage space for more productive uses, improve inventory management.**
- **Machine productivity increased . . . for example, 1 man now operates 4 machines against 3, previously.**
- **"Returnable-carrier" problem and small storage racks eliminated.**

NOTE—Savings and improvements cited were experienced following switch from traditional mill weight bundles (150 pounds to 400 pounds).

Look Into *LPR's Yourself

Our Portsmouth Division pioneered the development of *LPR coils in the early 1950's. PURPOSE—to improve efficiency and reduce costs in our own Welded Wire Fabric operations.

We'll gladly share our experience with you if you're a Brite Wire fabricator. We also invite you to visit our Portsmouth Mill to see for yourself how *LPR's perform. For an appointment or for further information on any DSC products, please call your nearest DSC Customer "Rep" or write Detroit Steel Corporation Box 4308, Detroit 9, Michigan.

CUSTOMER "REP" OFFICES

Detroit, Grand Rapids, Jackson, Mich.; Cleveland, Cincinnati, Columbus, Dayton, Toledo, Ohio; Hamden (New Haven) Conn.; Worcester, Mass.; New York City, Rochester, N. Y.; Chicago, Ill.; Milwaukee, Wisc.; Indianapolis, Ind.; St. Louis, Mo.; Charlotte, N. C.; Louisville, Ky.; Houston, Texas.

*A DSC TRADE MARK

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Performance Proved DSC®

DETROIT STEEL

Flat Rolled and Wire Products

Higher Steel Prices?

When the steel wage settlement was announced Jan. 4, there were valid reasons for consumers of steel to expect price increases by Dec. 1, perhaps sooner.

For your planning, now is a good time to take a closer look at the prospects for price increases.

You can use this rule of thumb: Each penny of wage increase boosts steelmaking costs 40 cents a ton. So the 41 cent wage package could be translated into a prospective $16 a ton price increase.

But an increase of that size is not realistic.

The steel industry is running into more intense competition from aluminum, prestressed concrete, plastics, wood, glass, and other materials.

Foreign competition is affecting direct sales of steel and products made of steel.

Costs of major raw materials purchased by the steel industry are either lower or have held relatively stable for many months. They include iron ore, scrap, ferromanganese, zinc, tin, nickel, and copper. Steelmaking scrap is selling at $34.33 a ton, nearly $30 a ton cheaper than it was at the end of 1956.

The steel industry is also engaged in a cost reduction campaign that ranges from the preparation of raw materials to finished steel products. This year's program will cost $1.6 billion.

Steelworkers are helping to hold down costs via production efficiency—apparently, it's beginning to dawn on them that job security depends on a healthy competitive industry.

Another factor that should be considered: The 41 cent wage package, while inflationary, is much less so than the 1956 package of 83 cents. Eighty-two cents of it was effective by July 1, 1958. A 1 cent cost-of-living adjustment was delayed to Jan. 1, 1959.

The shock of the new wage burden is spread out: 14 cents in fringes on Jan. 1, 1960; 11 cents in base wages on Dec. 1, 1960; and 10 cents in base wages on Oct. 1, 1961. Six cents in additional wages is tied to the Bureau of Labor Statistics' consumer price index, but the January figure was the lowest since September, 1959.

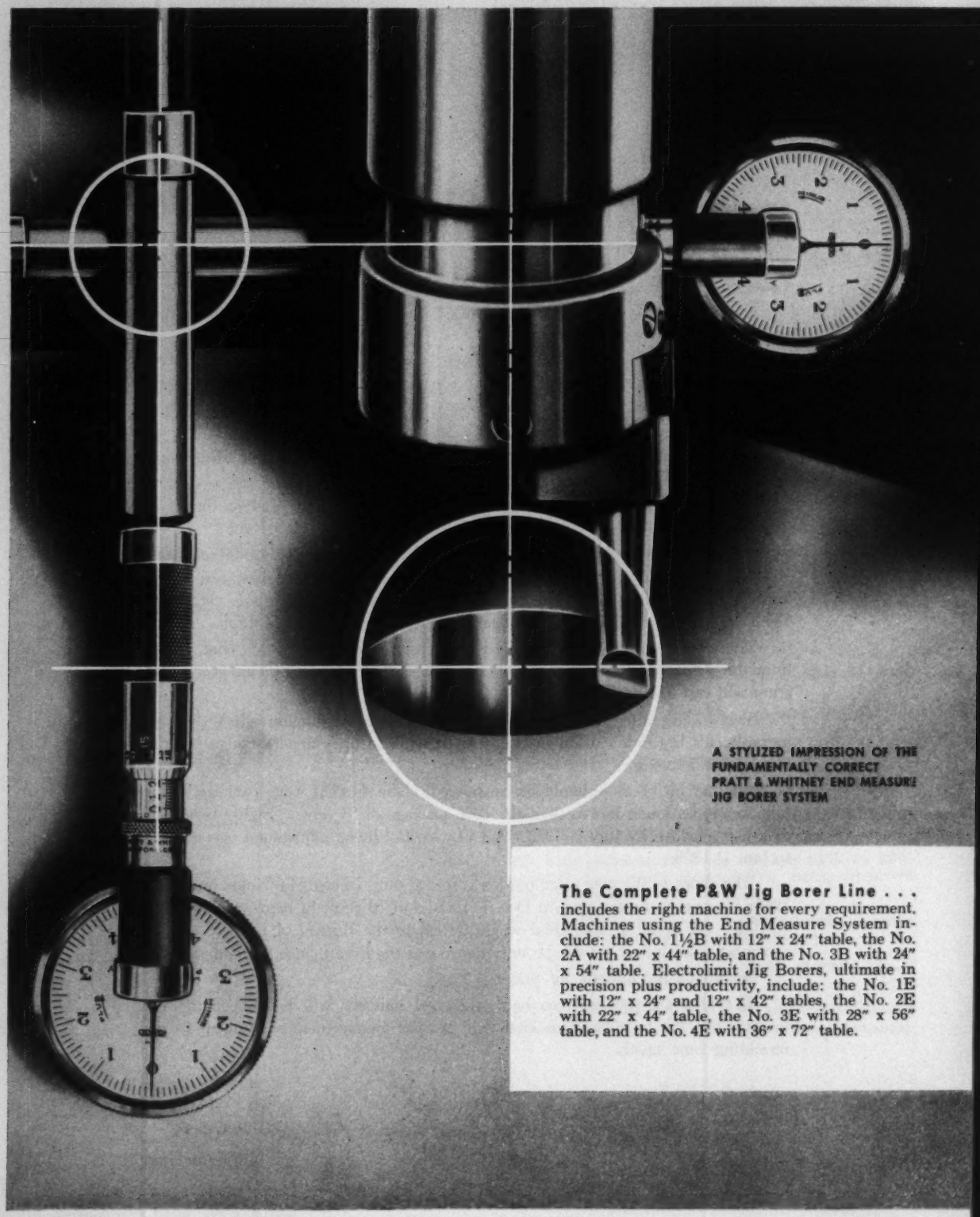
So what's the outlook for prices?

If profits are squeezed too hard, the steel industry will be obliged to raise prices. But the considerations cited will temper management's judgment in determining how much.

Irwin H. Such

EDITOR-IN-CHIEF

ACCURACY



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The Complete P&W Jig Borer Line . . . includes the right machine for every requirement. Machines using the End Measure System include: the No. 1½B with 12″ x 24″ table, the No. 2A with 22″ x 44″ table, and the No. 3B with 24″ x 54″ table. Electrolimit Jig Borers, ultimate in precision plus productivity, include: the No. 1E with 12″ x 24″ and 12″ x 42″ tables, the No. 2E with 22″ x 44″ table, the No. 3E with 28″ x 56″ table, and the No. 4E with 36″ x 72″ table.

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Pratt & Whitney Jig Borers

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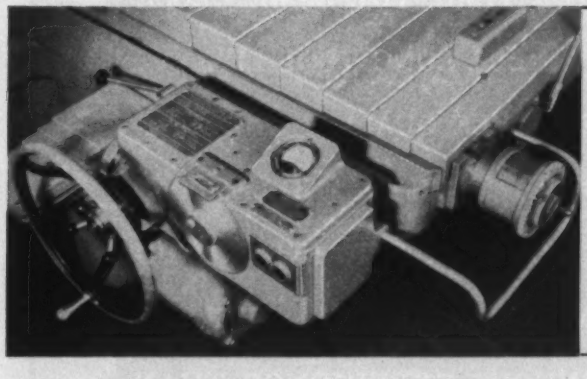

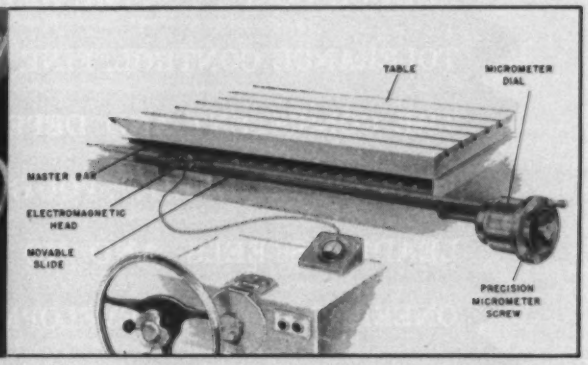

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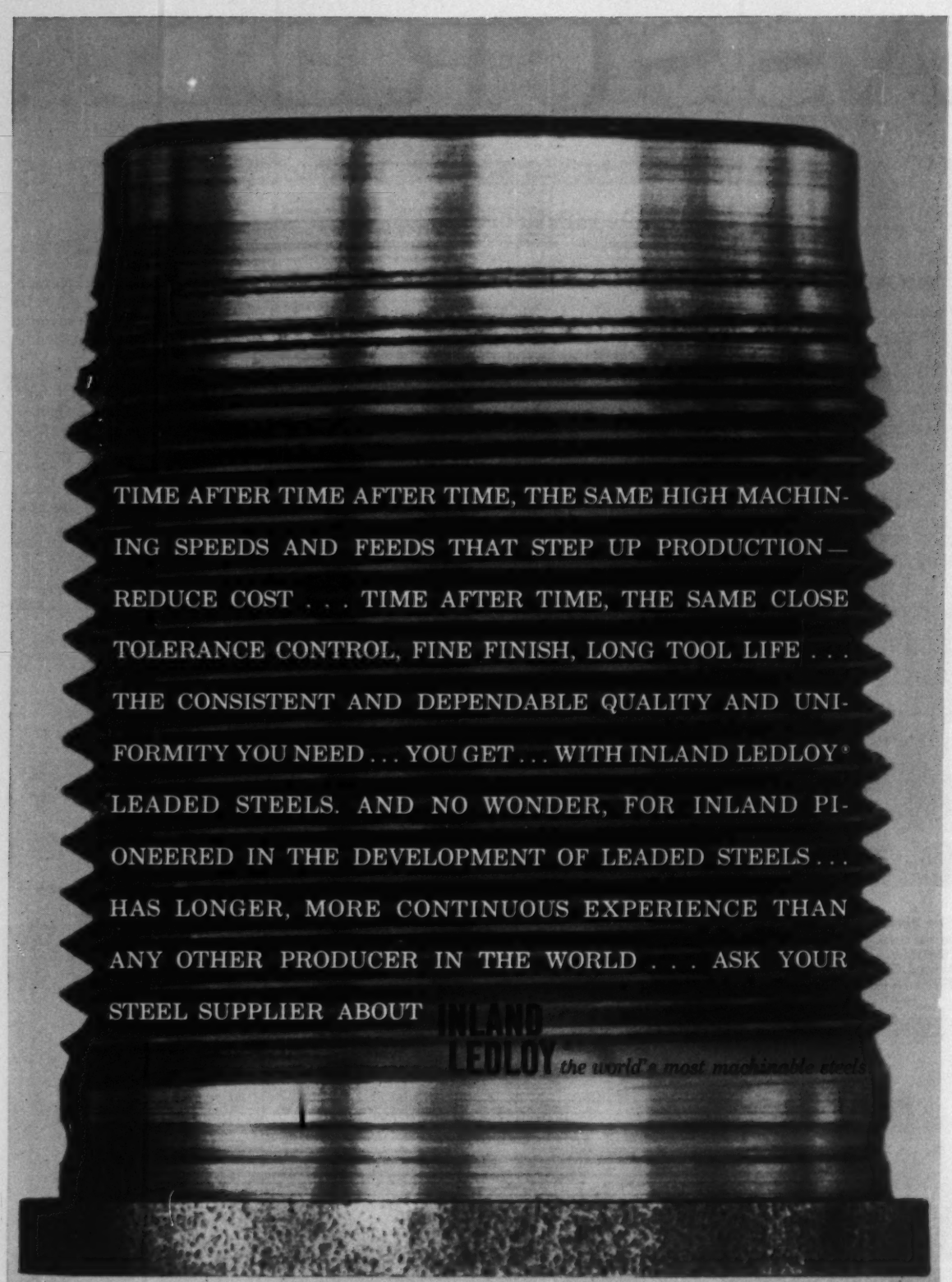
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Why Partmakers Hold the Price Line

YOU CAN PLAN on paying the current price for components at least until next fall.

Any changes then will hinge primarily on what happens to steel prices when the industry's direct wage boosts become effective Dec. 1.

That's what metalworking's partmakers reported to STEEL last week in a spotcheck of their business activities. Two other factors also play a key role in the pricing outlook:

1. Competition's getting tougher, and scattered reports of price cutting are cropping up.
2. The downward revision of 1960's over-all business prospects (see Page 67).

But business prospects are still good. Component sales—always a good barometer of the short term outlook—are running 2 to 20 per cent ahead of 1959 levels. Most partmakers feel the second quarter will be equally good, even though some soft spots are beginning to show.

1. ***Sales remain above 1959 levels, but soft spots are appearing.***

2. ***Competition's getting tougher; some price cutting reported.***

3. ***They're waiting to see what happens to steel prices.***

• **Strong Markets**—Makers of motors, electric controls, bearings, forgings, and other components going into steel mill equipment are beginning to feel the impact of the steel industry's expansion and modernization programs. The missile market is active. Machine tool business is generally good. Air conditioner production is running at a fast clip in preparation for summer sales. Increases in capital expenditures by the railroads are being felt by foundries, forgers, and suppliers of diesel engine parts.

Companies supplying the appliance and material handling equipment markets find business about equal to 1959's.

• **On the Minus Side** — Sales to farm equipment, earth moving, and construction machinery manufacturers are lagging. Aircraft markets are down from year-ago levels.

Recent cutbacks in auto production have received more than their share of publicity. Edward N. Cole, general manager of General Motors Corp.'s Chevrolet Div., lashed back at midweek: "There have been a lot of crepe hangers running around saying the market has slumped, but we don't feel that way." He's sticking to his earlier forecast of 7 million car sales (including imports) this year.

Chevy sales so far this year are 15 per cent ahead of 1959's. In the first two months, the Corvair has accounted for 13 per cent of Chevrolet sales.

• **Fastener Sales Mixed** — As a group, fastener makers give the spottiest business report. A Pittsburgh firm says its first quarter sales will be 20 per cent ahead of 1959's, but it looks for a dip in the second period due to auto cutbacks. A Chicago firm says its sales are running 20 per cent behind year-ago levels. A third company blames imports for much of its business decline and cites this example: A Japanese firm is quoting 52 cents a pound for a fastener the domestic firm sells for $1.52. Some price cutting in the industry is also reported.

Most gearmakers boosted prices about 5 per cent last fall, and no additional revisions are predicted. First quarter sales of companies contacted by STEEL are about 10 per cent ahead of 1959's. In addition to steel mill equipment and machine tools, papermaking and food processing machinery markets are active.

Bearingmaker sales average about 5 per cent ahead of last year's. S. H. Smith, vice president-sales for SKF Industries Inc., expects second quarter orders to be slightly above those in the first. His firm's shipments in the first period are about 12 per cent ahead of 1959's. SKF and most others in the industry expect prices to hold the line.

• **Foundry Outlook**—Foundries are battling to keep sales up to 1959 levels. Competition is keen, and some price cutting is reported. While several firms indicate substantial sales declines in the first

quarter, a few are enjoying gains. Arwood Precision Castings Corp., a New York producer of nonferrous castings, says its shipments in the first quarter will be 15 per cent above 1959's.

Forging plants indicate sales are running slightly ahead of year-ago levels. Some upward price revisions were made last fall, and no further increases are anticipated unless steel costs go up.

Fractional horsepower electric motor sales are still ahead of 1959's, but manufacturers say the over-all outlook depends upon appliance sales. Integral horsepower motor sales are 10 to 15 per cent ahead of last year's. C. G. Skidmore, vice president-sales for Louis Allis Co., feels the second quarter should be 15 per cent ahead of the first period. Motor prices were increased about 5 per cent last summer, and manufacturers do not expect to make further changes, at least until this fall.

• **Stampers Pinched** — The cost-price squeeze is still on in the stamping industry. Some companies were able to push through price hikes last year; others held off and would like to make adjustments this year. But competition is fierce and will probably keep the lid on prices until fall. Sales reports are spotty.

U. S., Red Trade Grows

The value of exports of nonstrategic goods to Eastern Europe authorized in the last quarter of 1959 reached the highest level in eight years, reports Secretary of Commerce Frederick H. Mueller. The sum, in terms of export licenses approved: $30.5 million. Total for the year was $55.9 million.

Exports to Russia dominate, $19.9 million (textile mill—$17 million, isobutyl alcohol—$746,000, styrene monomer—$420,750); farm machinery for Russia and Rumania, $437,000; passenger airplanes for Poland, $7.8 million; sulfur for Czechoslovakia, $690,000; tobacco for Czechoslovakia, East Germany, and Hungary, $600,000.

Applications rejected during the period amounted to $1.4 million.

U. S. exports to Eastern Europe in the third quarter of 1959 amounted to $40 million.

Aluminum Producers Face Two-Price Charge

Europeans can buy U. S. aluminum for less than domestic price. Extruders charge discrimination. Producers reply: If we didn't sell overseas, prices here would be higher

THE IMPACT of foreign competition took a new twist last week. In a public statement, the Aluminum Extruders Council is charging that domestic producers of aluminum are discriminating against independent extruders in the U. S.

In a two pronged blast at Aluminum Co. of America, Kaiser Aluminum & Chemical Corp., and Reynolds Metals Co., the council declared: 1. The major producers of raw aluminum are marketing their own fabricated products at prices that do not cover price increases on raw aluminum announced last December. 2. They sell raw material to European buyers for 22.25 cents a pound, plus 1 cent for insurance and freight, compared with a domestic price of 26 cents a pound.

The council pointed out that the independent fabricator is in the awkward position of buying raw material from U. S. companies that sell the same type of aluminum fabricated products. The council claims: The margin between the producers' price for aluminum pig and their price for the most common extrusion was 24.4 cents a pound on Mar. 1, 1949. The margin dropped to 23 cents in 1955, 19.7 cents on Jan. 1, 1960.

On the other hand, the independent extruder, points out the council, paid 16 cents a pound for aluminum pig in 1949 and had to meet the big producers' extrusion price of 40.4 cents per pound. At the beginning of this year, the extruder had to pay 26 cents for his aluminum and had to meet the producers' extrusion price of 45.7 cents. His working margin has dropped 4.7 cents.

A THERMOELECTRIC GENERATOR built by the Russians is examined by Martin Co. executives, J. Donald Raught (right) and Dr. Mostafa E. Talaat. Heat from the kerosine lamp is converted into electricity

• **Fire Returned** — Alcoa contends that the domestic price of aluminum is already too low to support extensive research, development, and promotional efforts to create new markets and expand present ones. "All those efforts benefit the independent extruders directly or indirectly," the company says.

The firm points out that it is not the major supplier in the European market and "must sell competitively or not at all in that area." Alcoa concludes: "Failure to take advantage of sales opportunities in the foreign market at prevailing prices would result in decreased domestic production, higher production costs, and possibly higher prices to domestic consumers."

David P. Reynolds, executive vice president, Reynolds Metals Co., says that only in seeking markets outside the U. S. "can we avoid layoffs of our employees." He emphasizes: "It must be obvious that we cannot sell pig overseas at more than the price prevailing in that market."

The Aluminum Extruders Council reports that 25 per cent of all aluminum consumed in this country is used by extruders.

Army Unveils New Fluid Control

THE ARMY took the wraps off a new fluid control last week that shows promise of many applications in the machine tool, appliance, automotive, material handling, and other industries.

Developed by the Army's Diamond Ordnance Fuse Laboratories (DOFL), the control uses gases or fluids as its working substance. (Principle: A low power stream of fluid is directed against the side of a high power stream of fluid.) The control has no moving parts, and in many ways its functions are similar to those of electronic systems. It does amplification, feedback, computational, and memory functions.

• **Significance** — DOFL claims a whole new class of amplifiers, computers, logic circuits, and control systems will result from the technique.

Although military applications of the new control are classified, the research on the principle is not. DOFL sources say handbooks will be available within a few weeks to all engineers who want them.

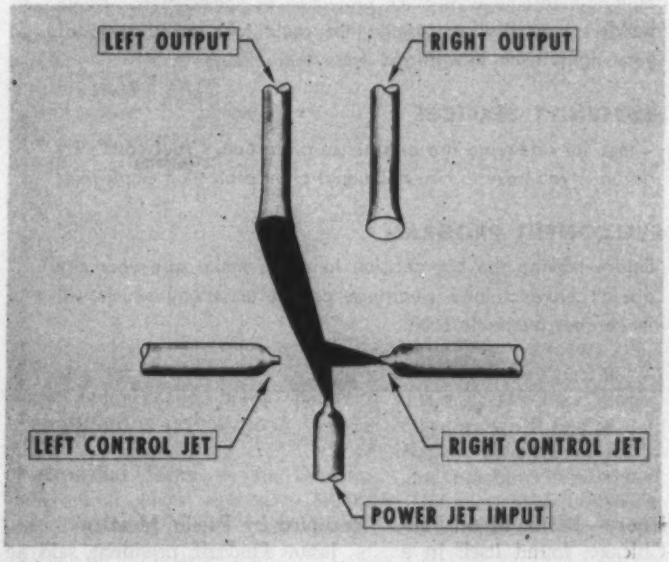
• **Materials**—The control units can be made of any material which can be molded, machined, stamped, or etched. By designing the passages to take advantage of what is already known about flow, pressure, and pneumatics, all the basic operations of computation can be done. The units can also be miniaturized.

The basic building block of the DOFL system is the *pure fluid amplifier* in which low pressure streams are used to control high pressure power streams. In function, they are similar to the vacuum tubes with push-pull characteristics on the flow of electrons.

• **Potentials** — The capability of a pure fluid amplifier for high temperature operation undoubtedly goes beyond that of any other known amplifying action, DOFL researchers report. A properly designed unit could operate at white heat if a refractory material is used for the body and a stable, noncorrosive gas is used as the fluid.

In the computing field, the new control offers a new medium to work in.

The units will not be as fast as electronics, but they are faster than mechanical systems, cheaper to make, and should last indefinitely.



Without the use of moving parts, the output stream is controlled by low pressure stream jets from the side. The system's inherent simplicity, ruggedness, and low cost should make for rapid exploitation

Fluids in motion do many tasks today. But such systems employ parts like pistons, valves, diaphragms, and vanes to control fluid flow. Here's a new control that promises to almost eliminate maintenance problems and improve reliability.

New Steel Facilities For Canada Pushed

NEW CANADIAN steel facilities will soon be established on northern Vancouver Island, says a government source in British Columbia.

Successive provincial governments have long tried to attract steelmakers to the area without success. Now, says Dan Campbell, member of the British Columbian legislature, a group of Vancouver Islanders promoting the industry has been joined by several important B. C. firms.

Mr. Campbell says an industrial estate will rise on filled land adjacent to Courtenay, north of Nanaimo. "The ingredients of a steel project, which must be brought together, can all be found at the location," he says.

"The proposal is geared to provide for the increased structural steel requirements of British Columbia in the boom years ahead," including those for "new hydroelectric installations and a current secondary expansion," he points out.

January Strikes Show Dip

Strike idleness in January totaled 1 million mandays, reports the Department of Labor. That is about half of the January, 1959, total. Of the 325 stoppages: 200 began in January and idled about 65,000 workers, 125 continued from December, 1959, involving about 75,000 workers. Two major stoppages in the metals fields, each idling more than 5000 workers, continued from 1959: Kennecott Copper Corp. and Anaconda Co.

Before You Move to the Suburbs . . .

Check These for Plus and Minus Factors

1. LAND COSTS

Suburban sites are usually cheaper. But costs tend to mount when plants spread out, and diningrooms, parking lots, and other conveniences are added.

2. UTILITIES

Costs in suburbs are generally higher, particularly water.

3. TAXES

Initially, suburbs have advantages, but beware of fast growing residential communities with inadequate industrial planning.

4. SHIPPING COSTS

Unless most of your customers are in the immediate area of your present plant, these costs will show little change.

5. LABOR

When you move, you'll lose some of your work force—perhaps some people you value highly. Be sure you can replace them in the new community.

6. SERVICE & SUPPLIES

Much will depend upon the type of business you're in.

7. INDUSTRIAL ZONING

Manufacturers need as much protection as homeowners. Home builders may file complaints that could take away some of your rights even though you were there first.

8. COMMUNITY SERVICES

Check for adequate fire and police protection. Your costs may go up if you have to hire additional plant protection employees.

9. DEVELOPMENT PROGRAM

Before making the big decision to move, make sure your city doesn't have a land clearance project underway which will make sites available soon.

INDUSTRY'S move to the suburbs may have passed its peak.

The exodus is losing some of its appeal because of considerations like these:

- Relocation often disrupts the supply of materials and services, as well as the delivery of products.
- Companies often lose valuable employees.
- Utilities often cost more (especially water).
- The advantage of cheaper land is often offset by an increase in costs per employee: Plants tend to spread out, meaning more working space per employee; facilities such as parking lots and diningrooms are added.

• **Case History**—Wedler Bros. Inc., Cleveland, a contract manufacturer, faced a move. Its plant was overcrowded, and management seriously considered a suburban relocation. Before the plan was finalized, a property adjacent to the plant became available; it was purchased, and the company is staying where it is.

Jack Wedler, treasurer, believes his city location has many more advantages than a suburban site. In his business, where 24 hour service (heat treating and plating) is a necessity, the easily reached shops are money savers. Odd lots can be taken care of without waiting for minimum loads. Close sources of supply mean the firm can draw on them without keeping large inventories.

• **Case History**—Pacific Metal Fabricators, Chicago, found itself in a similar situation. It was leasing half a building; the lease was expiring; and the owners needed the space occupied by Pacific Metal.

James Findorff, president, said he considered moving to a suburb where land was available at lower cost, but disadvantages outweighed

advantages. The centrally located firm has customers in all parts of the city; relocating in a suburb could cause serious shipping problems. Most of Mr. Findorff's employees live in the central area and he wanted to retain them.

After searching several months for the kind of industrial property he wanted, the president found it just a mile west of his present location. His new factory building is now being erected.

• **Another Tack**—Portable Electric Tools Inc. couldn't find the space it needed to expand. Occupying five buildings on Chicago's South Side, and another on the Northwest Side, it was splitting at the seams.

The tool firm is building manufacturing and office space in Geneva, Ill. It will move its entire operation there sometime this year. Although it was forced to move, the company feels it retains many of the advantages of being in the city because it is staying in the metropolitan area.

• **Other Side**—Although you can make a case against moving to the suburbs, not every company can solve its problems by staying in the city.

For example, John W. Evers, former president of Commonwealth Edison Co., Chicago, says: "While Chicago itself is the most attractive for location of industry, there is a dwindling amount of land within the city available for suitable land sites.

"The program of land clearance in the last few years has helped materially, and the redevelopment of the Yards (stockyards) area industrially should be an important addition to our economy. But there still remains a scarcity of suitable sites in the city."

The type of plant being built today is also hampering cities trying to bring in new industry. Improvement in technology has compelled industry to build sprawling, single story factories to house modern manufacturing processes.

• **Remedial Steps** — In Detroit, where high taxes, aggressive labor, and outmoded plants have driven much industry from the area, a mayor's Industrial Development Commission has a program started that other cities in other areas might do well to copy.

Three industrial reclamation projects are planned. The first, the Milwaukee Junction area which covers 350 acres and is intersected by two major expressways, is being developed. Old buildings are being torn down; new ones are rising.

"We expect that this area will be completely redeveloped by 1967," says William Sloan, director and secretary of the commission. "What we will have provided is an area within the city of Detroit that is a balanced mixture of heavy and light industry but will have a planned suburban look. The area will be restricted for business because we believe that industry should have the same protection for its buildings and transportation facilities that citizens have for their homes."

Cleveland is in the same fix as other cities. Republic Steel Corp. which has plants and its headquarters in that city, just announced a $159 million expansion. But the bulk of it will go to Youngstown and Warren, Ohio. Reason: No space in Cleveland.

The city has an opportunity to gain some of the expansion dollars if it will go along with Republic's plan to culvert a small stream near its plants. The project would free land for stockpiling of raw materials, releasing other land for building new facilities.

The catch: The project would cost the city $500,000 to $750,000.

The problem suggests a solution to keep plants within cities. Suburban communities are offering attractive inducements to industry. Cities will have to match them.

• **Over-all View**—Mayor Richard J. Daley of Chicago sums up his views on the flight to the suburbs with this statement: "There has been some concern about the movement of industry from the city limits. Actually, many of our basic industries have expanded in their locations within the city. In addition, most of the new industries which have grown throughout the suburbs depend heavily on the basic metal and machine industries in the city. The growth of industry in the suburbs supports our industry."

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Pilot Plants Will Test Semitaconite Ore Potential

Several billion tons of iron ore may be added to the nation's reserves if tests prove semitaconite deposits can be processed commercially.

M. A. Hanna Co., Cleveland, plans to build a $2 million pilot plant near Cooley, Minn., with a capacity of about 10 tons of ore an hour.

Oliver Iron Mining Div. of U. S. Steel Corp. will build a similar facility with a capacity of 5 tons an hour at Coleraine, Minn.

The proposed plants will experiment with roasting processes to change low grade, nonmagnetic, semitaconite chemically to magnetic form. In its raw state, the ore cannot be concentrated by the processes used for taconite, a magnetic ore.

Semitaconite is a lower grade of ore but is much softer and easier to mine and crush than taconite.

Hanna indicated that favorable tax treatment granted in 1959 by Minnesota for semitaconite was a factor in its decision to proceed with a pilot facility. Comparable legislation was adopted for taconite in 1941.

Mesta Gets Big Mill Job

Mesta Machine Co., Pittsburgh, has been awarded a contract for a plate mill at the Gary, Ind., Works of U. S. Steel Corp. The installation will be arranged to operate as a 160 or 210 in., four high, reversing plate mill.

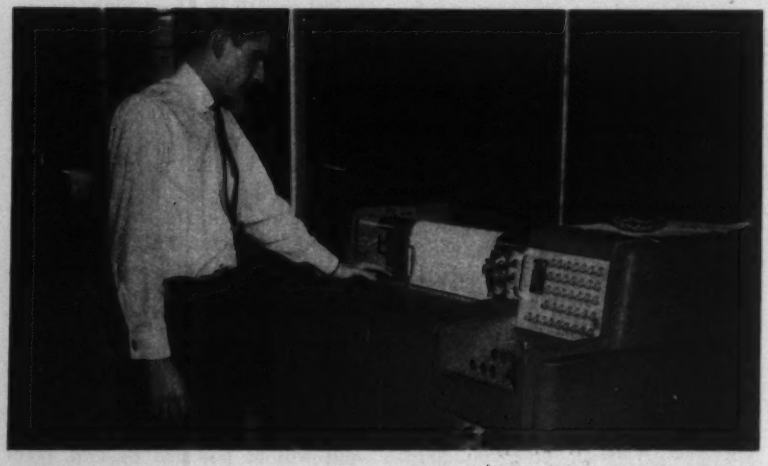
Designed to roll plates from reheated slabs or hot slabs directly from the slabbing mill, it will include a two high scale breaking stand, the 160-210 in. mill, retractable plate levelers, shears, slab handling equipment to and from reheating furnaces, mill and transfer tables, cooling beds, and facilities for disposing of crop and shear scrap.

To arrange the mill for 160 or 210 in. capacity, both housings will shift on sliding shoe plates to maintain the same mill centerline. The mill will be powered by two, 6000 hp, direct drive motors.

200 Play in

Players in "Champion Co. of Cleveland" plan market strategy . . .

Univac weighs, balances decisions from 34 "companies" and . . .



High speed printer records composite results for each "month"

TWO HUNDRED businessmen played a serious game early this month.

For a day and two evenings, they put their experience and minds to a test by tackling a simulated marketing management problem. Two Remington Rand Univacs did the computing.

• **The Benefits** — Participants say they derived these benefits from playing the game:

1. Better knowledge of factors and data most important in marketing problems. (Most players held operating or financial jobs in real life.)
2. Broader horizons, with new insight into the complexities of general business not usually afforded in a man's real-life niche.
3. Experience in making decisions because many were reached in a few hours that would normally be made over weeks or months.
4. New understanding of the need for long range planning and strategy, which became particularly evident at the critique after the games were over.
5. Practice in the use of decision-assisting tools.
6. Experience in working with budgets, forecasts, charts, and mathematical models.

• **The Setup**—For the first time, the game was played simultaneously by participants in different cities. The 200 players were divided into 34 teams scattered in Cleveland, Cincinnati, Columbus, and Dayton, Ohio, plus Indianapolis. The Cincinnati and Indianapolis participants phoned their decisions by direct line to a Univac at the University of Chicago. A computer at Case Institute of Technology in Cleveland gave the results for players in the three other cities. Previously, management games have been concentrated in one area.

Players got use of the Univacs at bargain rates because the 85 companies which sent representatives paid just nominal fees to the sponsor, Society for the Advancement of Management. The co-sponsor, Sperry

Five-City Business Game

Rand Corp.'s Remington Rand Univac Div., programed the game. The normal rental for a Univac and operator is $325 an hour. Each of the five cities logged about 10 hours of computer time, which would normally cost $3250 per city or $16,250 in all.

• **Ground Rules**—The exercise involved competing companies selling the same product in three independent regional markets—East, South, and West. The regions have different consumption characteristics which are programed into a Univac. Each responds differently to promotional and selling efforts.

Each team consisted of three to nine members who were free to organize in any way. Each started with these assumptions:

1. It will market a relatively new product which company ownership would like to exploit.

(The product has been marketed with fair success in an older division, but the board of directors wants the product more aggressively pushed and has staffed a new division for the job. The players are the marketing management of this division. They have an unlimited budget and complete authority, but they'll be held accountable for the division's progress at the end of a given number of months. In this case the game was played for eight "months.")

2. Although not defined, the product is an item that performs an old function in a new way.

(It is sold directly to the consumer by commissioned salesmen. The demand forecasts that are provided were obtained from an outside marketing research consultant who extrapolated the seasonality and regional distribution of the sales of the older product to the newer one.)

3. A number of competitors have established autonomous divisions to exploit a similar product in the same three markets.

(Each competitor begins operations at a point identical with all others in status and resources.)

• **On Their Mark** — Each "company" proceeded with its own strategies to try to place itself in the best financial and competitive position. The simulated markets in which they competed contained adequate realism to produce reasonable performance results from sensible decisions. Long range planning was rewarded, while hand-to-mouth operation generally produced a lower profit return. Each team was expected to behave as aggressively as consistent with its idea of how a new product should be launched.

Participants were discouraged from get-rich-quick gimmicks. There was none possible because the results of a given decision depended as much upon the reaction of competitors as upon the consumption characteristics of each region. The interaction feature made it difficult to analyze the precise effects of a single decision or strategy—as is the case in an actual marketing environment.

• **Get Set**—The players had to take into account various costs and charges assigned each decision or strategem. Examples:

Shipping charges per carload	$600
One-month salesman training	$1500
Monthly salesman salary, expense	$450
Competitors' advertising budget report	$1500

• **Go, Go**—As the month-by-month results of each team's decisions were weighed by Univac for the players, they had to judge the effectiveness of their advertising budget and sales force, the safety of their inventory policy, the wisdom of their pricing strategy.

Some groups ran into trouble by spending too much on their selling effort in the shallowest market, the South. Several teams lost out because they kept inventories too low and suffered stock-outs. Others achieved high volume, but at too low a price for good profits.

• **The Winner**—"Champion Co. of Cleveland" avoided most of those pitfalls and achieved the highest accumulated net profit for eight months—$159,000.

Its members (in the first picture, clockwise beginning at lower left): Don F. Lockwood of U. S. Steel Corp.'s American Steel & Wire Div.; Fred Harrell, a consultant; Ralph Hanna of B. F. Goodrich Co.; W. W. Hensel of Ohio Injector Co.; B. F. Norpell of Ernst & Ernst; and F. R. Terrant of Reliance Electric & Engineering Co. Mr. Norpell was chosen "president" of the team.

Kaiser 'Progress' Group to Study Seven Labor Areas

PRINCIPALS in Kaiser Steel Corp.'s "share the progress committee" held its first meeting last week and outlined seven areas it intends to explore in its quest to write a new chapter in labor negotiations:

1. A review of grievance procedures.
2. A possible widening of communications with workers to provide them with information comparable to that given the board of directors.
3. Experience on methods changes that has already accumulated.
4. Ways to get greater understanding of company plans among employees.
5. The future of incentives in the light of technological changes.
6. The possibility of inventing a new procedure to avoid strikes.
7. How benefits of economic progress can be shared among workers, stockholders, and the public.

The unique committee was established as part of the Kaiser Steel contract settlement with the United Steelworkers last fall. Key members include David J. McDonald, USW president; Edgar F. Kaiser, Kaiser Steel's chairman; and Dr. George W. Taylor, University of Pennsylvania professor, who headed up President Eisenhower's Taft-Hartley Board of Inquiry.

The next meeting will be held in Oakland, Calif., May 5 and 6.

• If you get an idea from this week's STEEL, you could earn $1000—Read Pages 5 and 6.

Treasury's Request for Tax Hike on Profits from Sale Of Depreciable Property Hits Snag, Despite 'Concession'

Joel Barlow

Industry Asks: Prove Your Intentions

THE TREASURY Department is seeking about $125 million in additional revenues each year by asking Congress to tax profits from the sale of depreciable assets (other than real estate) as ordinary income, rather than capital gains.

In the case of the airline industry, says J. D. Durand, secretary, Air Transport Association, that could mean a dangerous slowdown in the jet modernization program. Gains from the sale of the old piston type plane would be taxed at 52 instead of 25 per cent.

Joel Barlow, spokesman for the U. S. Chamber of Commerce, notes that sole proprietorships or partnerships, which include many small businessmen, would be hard put to justify modernization programs if profits from the sale of old equipment were taxed as normal income.

George Terborgh, research director, Machinery & Allied Products Institute, recalls that one of the reasons for taxing such profits as capital gains rather than ordinary income was to help plants modernize to meet the production emergencies of World War II and Korea. Mr. Barlow hints we face a similar emergency today with "nearly 50 per cent" of our industrial plants obsolete.

Treasury Wants to Make a Trade

The administration (STEEL, Feb. 22, p. 33) hopes to convince industry to accept the proposed change by promising that internal revenue agents will more readily accept the taxpayer's judgment of the useful lives of his equipment.

But industry isn't buying this "pig in a poke," as some sources have described it. Leslie Mills, chairman, Federal Taxation Committee, American Institute of Certified Public Accountants, reminds the department: "Despite numerous pronouncements since 1954 by the Office of the Commissioner of Internal Revenue that agents should not make arbitrary, unsubstantial depreciation adjustments, such adjustments continue to be proposed." He calls Treasury's assurance of a fair deal nothing more than a "vague promise."

Adds Mr. Terborgh: "Cases are constantly being brought to our attention in which field agents maintain positions that appear to run counter to Washington policy." Mr. Barlow points out an inconsistency in the department's present attitude: In the past, it has said that depreciation reform should come through legislation rather than by administrative action. Now, it is promising to reform administratively, rather than seeking a long range depreciation policy which will encourage growth, and, in the end, serve the best interests of the country.

Some Businessmen Would Compromise

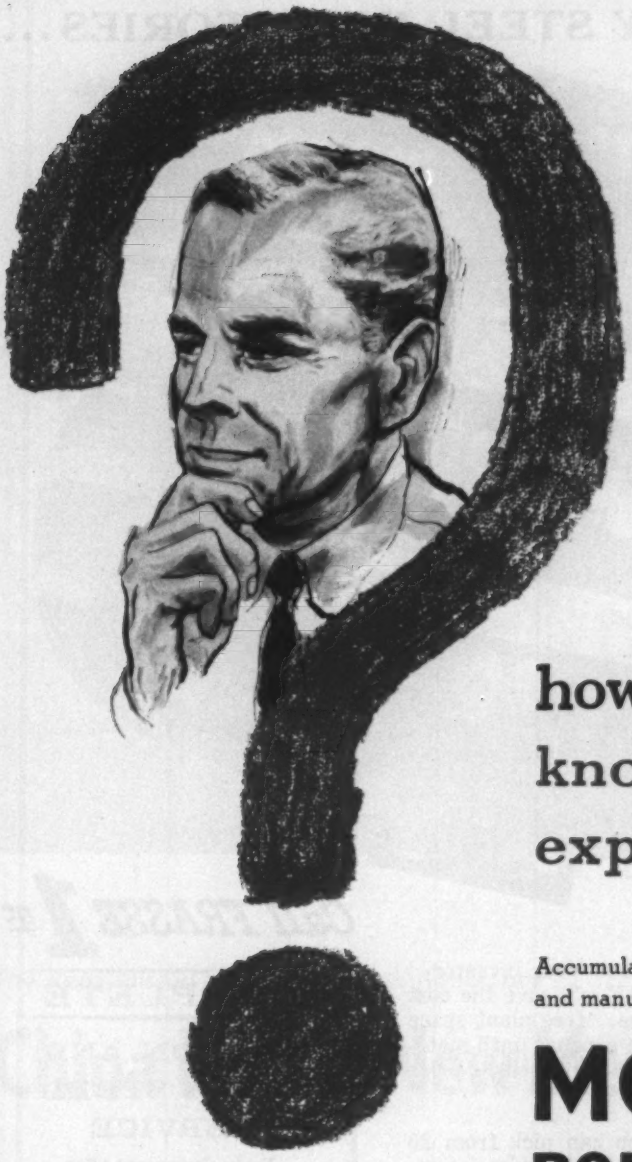
The issue is loaded politically; a "giveaway" charge is implied by the Treasury's attempt to close what it calls a "loophole" in our tax laws. It believes the $125 million in lost revenue to be the result of some taxpayers depreciating property "overrapidly."

To forestall the kind of a fight which could ruin all chances for significant depreciation reform, several industry spokesmen offered compromises to the House Ways & Means Committee. Mr. Terborgh thinks the ordinary income tax should be put to only that portion of a terminal gain in excess of the gain that would have been realized had the asset been depreciated under the straight line method.

Mr. Mills wants the ordinary income treatment applied only to equipment which has been held by the taxpayer for less than a certain number of years. He suggests five years as a possible dividing line. Another method of compromise, says Mr. Mills, would be to permit the use of an index number of purchasing power to be applied to the undepreciated cost at the time of sale, offsetting inflation.

Maurice Peloubet, New York accountant, says the Treasury's "program of administrative improvement" might be tested over a definite length of time. If unsuccessful, Congress could change the situation.

Mr. Barlow offers no point of compromise. He insists such legislation is "piecemeal" and puts the cart before the horse. The chamber will oppose that legislation unless "it is coupled with legislation or a definitive and fully implemented Treasury program for a more realistic depreciation policy."



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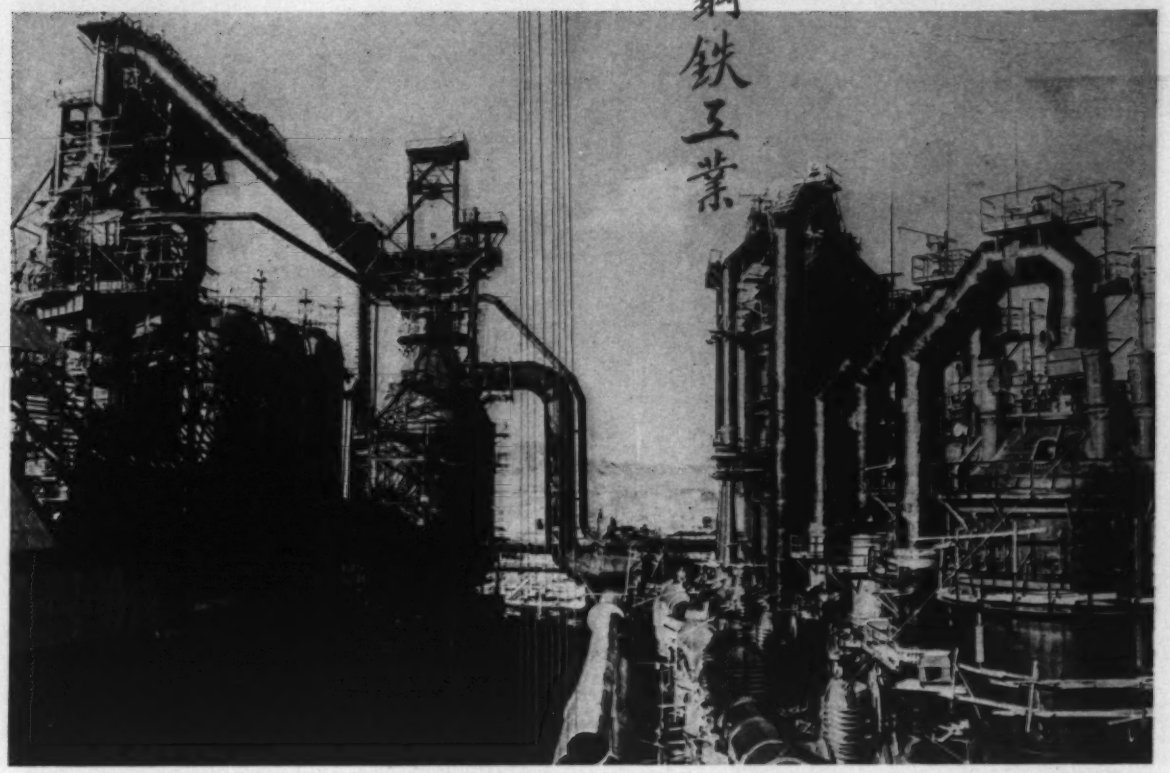


The new No. 1 blast furnace at the Paotow steel center in Inner Mongolia

The Reds missed their production goals, but . . .

China Boasts New Metalworking Savvy

RED CHINA claims her steel production exceeded 13 million tons in 1959. That's well below the original goal of 18 million tons (see STEEL, June 15, 1959, p. 99) but above the revised target of 12 million tons. However, some sources believe the Reds failed to meet either goal and estimate last year's output to be closer to 7.5 million tons.

Despite the downward revision of some production goals, the Chinese say they've more than doubled their iron, steel, coal, and electric power output in the last two years. Progress barometer: Steel made in backyard furnaces accounted for 3 million of the reported 11 million tons poured in 1958. Last year, the figure was so small it was not included in the production statistics.

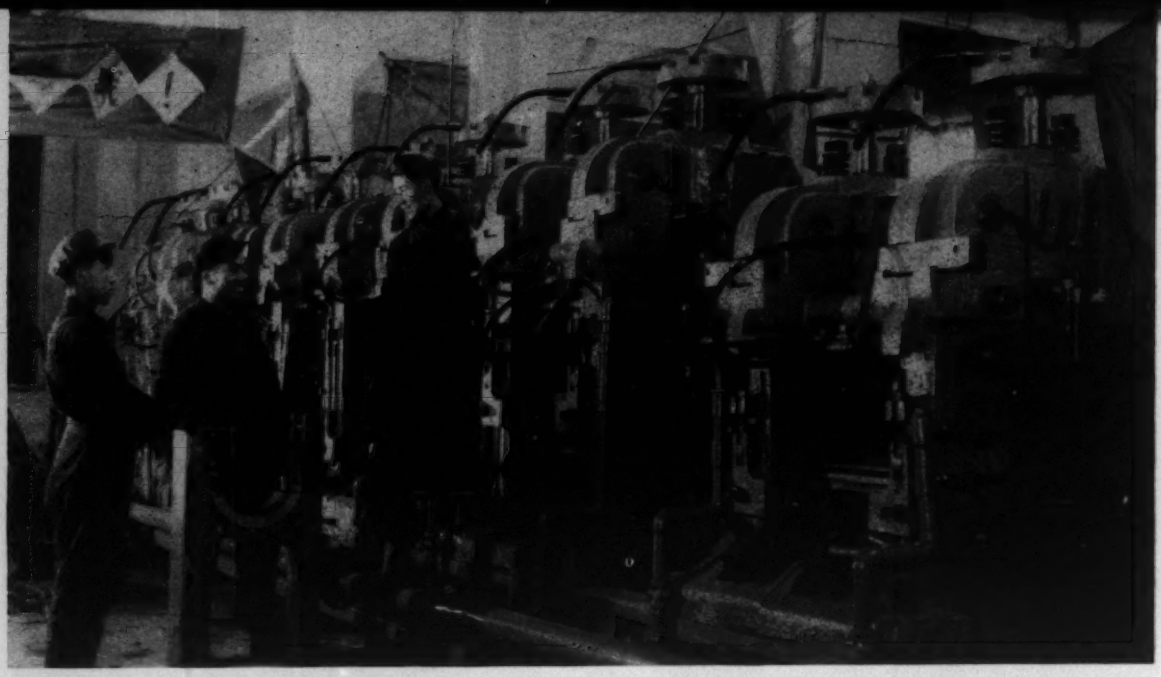
• With the exception of Tibet, it is said that all the nation's provinces and autonomous regions are producing pig iron and have laid a foundation for the development of an iron and steel industry.

Plans call for the construction of a dozen integrated iron and steel works, each with an annual capacity of 300,000 tons, and a similar number of smaller plants with a yearly capacity of 150,000 tons per unit.

Presently, China has 18 key iron and steel centers and more than 20 medium size plants and 300 iron smelting operations. In the first nine months of 1959, more than 40 blast furnaces (excluding small furnaces under 72 cu yd), 120 steel converters, and 40 rolling mills went into production. By the end of the year, 211 electric furnaces were operating. In addition, small converters with a reported annual capacity of 7 million tons were pouring steel.

• Iron ore output in the first three quarters of 1959 was claimed to be

This article is based on information gathered by Robert Westgate, Auckland, New Zealand.



These rolling mills are made at Shenyang in northeast China. Last year, Shenyang accounted for one-third of Red China's machine tool production

three times that of the same period of 1958.

It's reported that the number of iron mines has risen from 20 to more than 300 since 1958, largely due to extensive development of small mines. Small groups of modern furnaces, which accounted for half the 10 million tons of pig iron produced in 1959, are gradually replacing the backyard furnaces built in the winter of '58. However, pig output was less than half the original target of 23 million tons. Skeptics believe actual production was nearer 7 million tons.

The revised goal of 60,000 metal cutting machine tools was exceeded, boasts Peking. Original aim: 75,000 units. 1958 production: More than 50,000 units.

About 335 million tons of coal were mined, 45 million tons below the anticipated total.

• Anshan, Paotow, and Wuhan appear to be the backbone of China's steel empire.

Last year at Anshan, a battery of 65 coke ovens (annual capacity: 450,000 tons) began production. An automated rotary kiln which can produce 90,000 tons of magnesite annually was put into operation. The Anshan sintering plant now has three machines with a combined monthly capacity of more than 100,000 tons of pelletized ore.

In September, the first iron flowed from Paotow's big No. 1 furnace a year ahead of schedule. Capacity: 2500 tons daily. It has a high pressure top, carbon black bottom, and an intense air cooling system. Two, 65 chamber, automated coke oven batteries are in operation at Paotow, as are an iron mine, a refractory materials plant, power stations, and railway lines. A second blast furnace and third coke oven battery are under construction, as well as an ore dressing and sintering plant. An ore crushing project is being built at Paiyunobo, 90 miles north of Paotow.

The facility at Wuhan has an annual capacity of 1.5 million tons of pig iron. In October, a 250 ton capacity open hearth poured its first steel and a 500 ton open hearth began operating a month later. When completed, the Wuhan plant will have eight open hearths, each having a capacity of 500 tons. Most of Wuhan's 18 factories and mines began production last year.

• It appears that the Communists are making rapid technical advances.

Many steel mills have adopted a new technique which eliminates the drying out of converters after overhauling. The gain is said to be 12 to 16 more heats of steel.

By adding slag from an electric furnace to molten steel in an open hearth, the Chinese say they cut the melting time of a heat by an hour and boost production by nearly 8 per cent. High carbon structural steel can be turned out by this method when pig iron with a substantial sulfur content is used.

A plant in Penki is reported to have upped productivity by more than 17 per cent by using gas and oxygen to accelerate steel melting in electric furnaces.

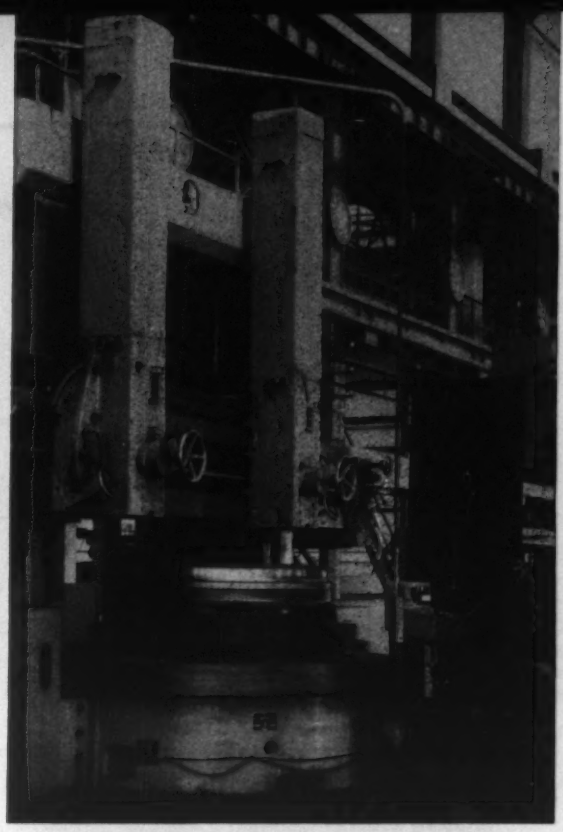
An improved cupola has been developed which is said to use less refractory material and have a longer operational period. Steel plates are substituted for firebrick lining around the melting zone, and cooling water is introduced between the plates and the outer shell.

• Soviet assistance has played an important part in China's industrialization.

Nearly 11,000 Soviet experts and 1500 experts from other Red nations have worked in China within the last ten years. But the Chinese are lessening their dependence on Russian advisers. Peking radio declares that two-thirds of the country's industrial projects now underway have been designed in China.

To keep pace with the country's rapid industrial progress, nearly 80 "institutes and schools" with 60,000 students have been established to

A high speed gearshaft for a rolling machine is made at the Wuhan heavy machine tool plant



A vertical lathe turned out at Wuhan in central China

turn out technicians and workers. About 30 universities and "middle schools" have set up metallurgical departments or have instituted metallurgical courses.

In the early years of Red China's industrial development most metallurgical installations were purchased abroad. But by 1958, the Communists were building much of their own equipment.

Some of the units recently completed include: Billet, blooming, continuous sheet rolling, large size beam rolling, and slabbing mills; blast furnaces; open hearths; steelmaking converters; bessemer converters for smelting copper; counter blow hammers; electric motors; gyratory crushers; flotation machines; and ore classifiers.

In the machine tool field, they've produced upright and horizontal drilling machines, 3170 rpm lathes for cutting hard alloys, a 70 ton universal plano-milling machine which can work parts more than 16 ft wide, a lead screw lathe with 0.0001 in. pitch error and accumulative error of 0.00035 in. in 11.8 in., and a 750 watt ultrasonic drilling machine capable of 25,000 vibrations per minute.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

How Chinese Machinery Compares

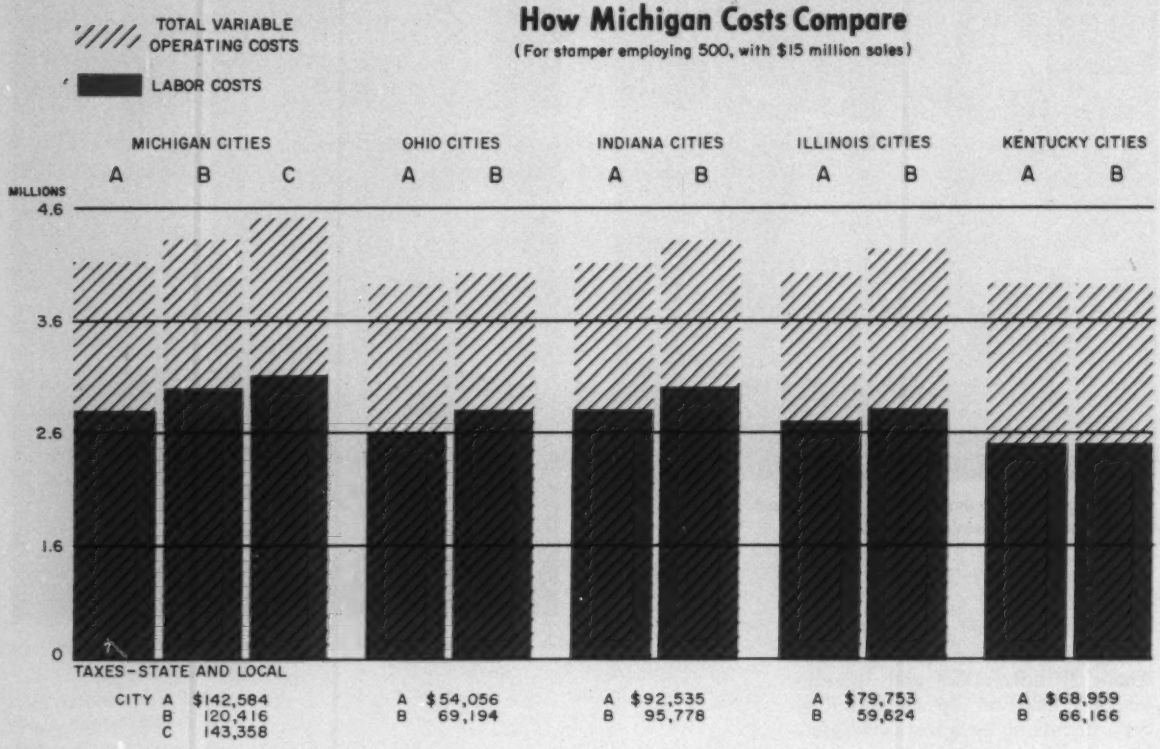
RED CHINA has not launched a drive to capture her share of the world's market for capital equipment. But when she does, she could become a tough competitor.

One U. S. builder of vertical lathes told STEEL he was surprised to see the degree of refinement evidenced by the Chinese counterpart. "Pedestal and pendant controls signify electrical sophistication beyond what most of us have expected from that country," he said.

Except for that, equipment shown here reveals a designer concentration on fundamentals, a relative disinterest in frills. Operator convenience is of little concern except when it directly affects machine output. Some control levers (particularly those used for setup) are more remote than Free World operators would expect.

Rigidity of machine tools (evidenced by the vertical lathe) is relatively lower than that of comparable U. S. models. The cross rail, for example, is narrower (by as much as 30 per cent) than that on domestic machines.

Housing finishes on the rolling mill dramatize an approach difficult for Americans to reconcile with their idea of typically artistic Orientals—they are not concerned with appearance. In general, the pictures show that Mao, and his advisers, seek only equipment features that affect the job to be done. That approach alone could help them jump to the level of technical competence in competition.



Michigan Defends Its Higher Costs

A REPORT of how Michigan ranks as a place to do business is due to be released next week by the W. E. Upjohn Institute for Employment Research.

The study shows that tax costs are higher in Michigan than they are in Illinois, Indiana, and Ohio (see chart above). Also, Michigan's production workers have the highest average weekly earnings in the nation.

But even though wage and tax costs are high, the study points out, companies in Michigan tend to get more services and more labor skills for the dollars they spend. As business expands, the Upjohn reporters suggest, other states will have to raise tax rates faster than will Michigan to provide services of similar quantity and quality. Transportation, utility, and occupancy costs in Michigan are comparable to those of competitive states.

Figures in the chart were developed for the report by Fantus Factory Locating Service, Chicago. In making the comparison, a hypothetical stamping firm with these characteristics is assumed: Employment 500, a pretax profit of $2 million on $15 million sales, $5 million capital investment, real estate valuation of $750,000. The cities listed are 34,000 to 105,000 in population.

• **Another View**—A less charitable view of the state was recently voiced by William C. Newberg, Chrysler Corp.'s executive vice president. He hinted that the firm might move its operations out of the state unless its tax climate improved. Chrysler is Michigan's largest manufacturer in terms of production investment—80 per cent of its cars are built in the state compared with about 35 per cent for both Ford Motor and General Motors.

After some hot verbal exchanges, L. L. Colbert, Chrysler's president, assured the citizenry that his firm has no intentions to leave immediately. But he carefully avoided making any commitment.

The company complains about the high city-county assessment rates and state business activity tax which is based on sales, not profits. Chrysler paid $31 million in taxes last year, while suffering a net loss of $5.4 million.

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...is assured
Detroit Steel Corporation
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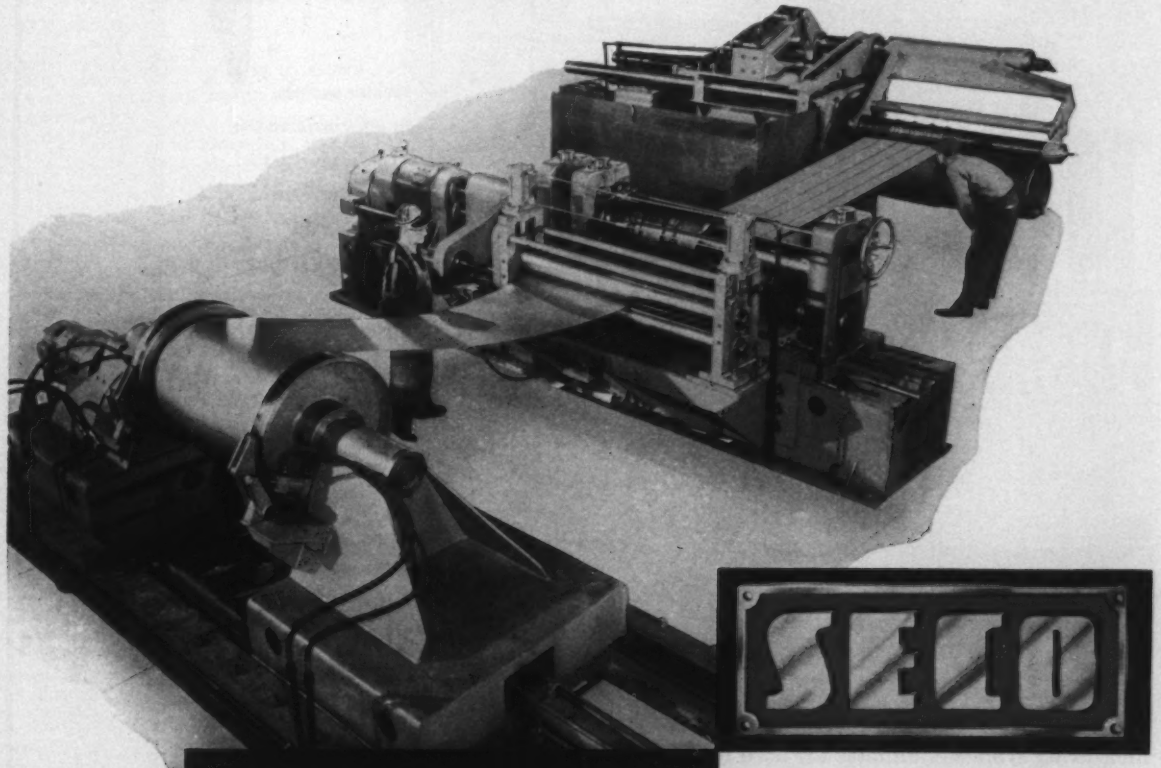
SECO 60" SLITTING LINE

Availing themselves of SECO's facilities for custom building efficient slitting lines, the Detroit Steel Corporation, Detroit, Michigan, just recently installed this 60" Seco Slitting Line thereby assuring predictable performance. The entire unit, consisting of a cone-type Uncoiler, Slitter and Recoiler, was specifically designed and built by SECO for this customer.

Whatever your present requirements may be, call upon SECO's staff of trained sales engineers to assist you in planning for the present as well as your 'future' capacity.

Seco builds a complete range of slitting lines available from 12" to maximum strip widths.



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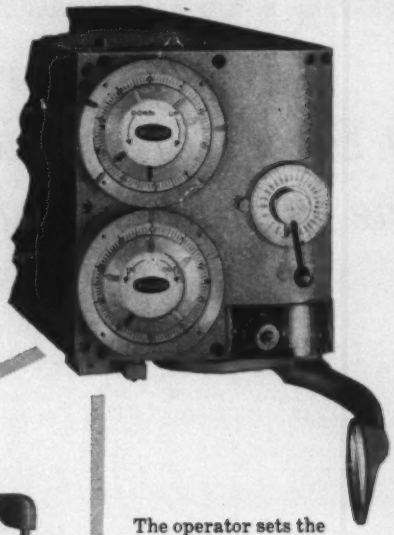
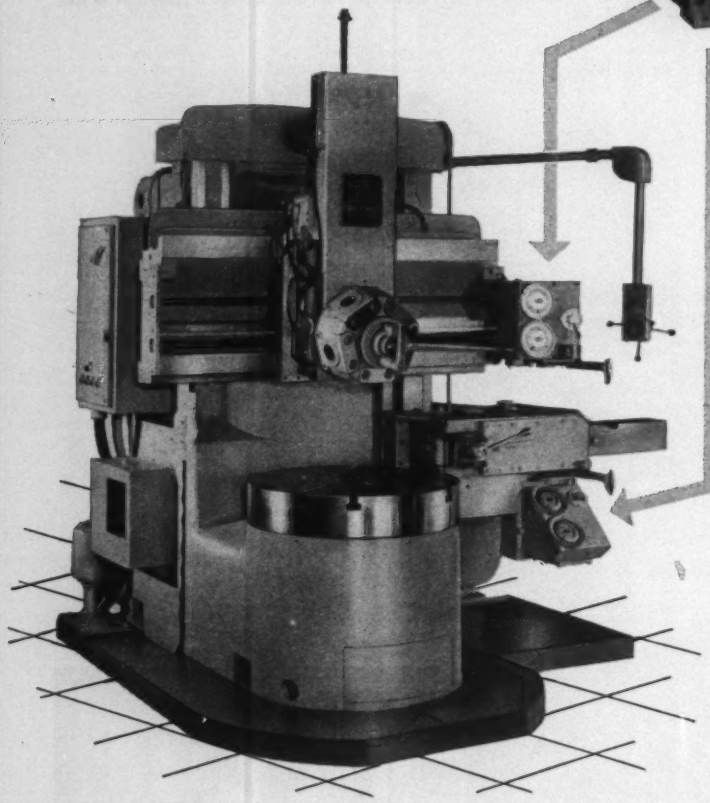
A completely new concept in measuring, utilizes large, easy to read, clock-type dials with dual pointers.





The operator sets the movable clips, around the dial, to conform with the workpiece requirements and by rotating the pointers to these settings he *knows* the tool is precisely located for the operation to be performed. The graduations and numerals remain stationary while the pointers rotate, one registering tenths of an inch and the other thousandths, for exact head positioning.

When coupled with the unique DYNATROL* control, this accurate measuring system eliminates the need for handwheels, for head-positioning, in either feed or traverse and increases the productive time of the machine.

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Dynatrol V.T.L. is POWER CONTROLLED

By lever or pendant—it's your choice—head traverse rates can be varied from zero to nine feet per minute. Easy-to-read dials show exact position.

Feed selector gives infinitely variable feed rate without interrupting the cut.

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Available equipment includes:

Bullard variable speed drive for infinitely variable table speeds throughout the full range with no loss of usable horsepower.

Fully automatic operation by Bullard Man-Au-Trol or point-to-point or continuous path numerical control systems.

Unique Size-Au-Trol® for accurate positioning of all heads. Contouring attachments: Hydraulic, electronic or electro-hydraulic. Four- or five-sided power-indexing turret heads. Thread cutting, drum scoring and angle turning attachment. Power-operated chucks.

Dynatrol V.T.L. is COMPACT

The new Bullard Dynatrol V.T.L. is compact in design, rigid in construction, lower in height, reduced in floor area.

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Automatic lubrication throughout... fewer parts... fewer adjustments... easily accessible.

"YOU CAN'T BEAT A BULLARD"

Whipshafts May Solve Linkage Problems

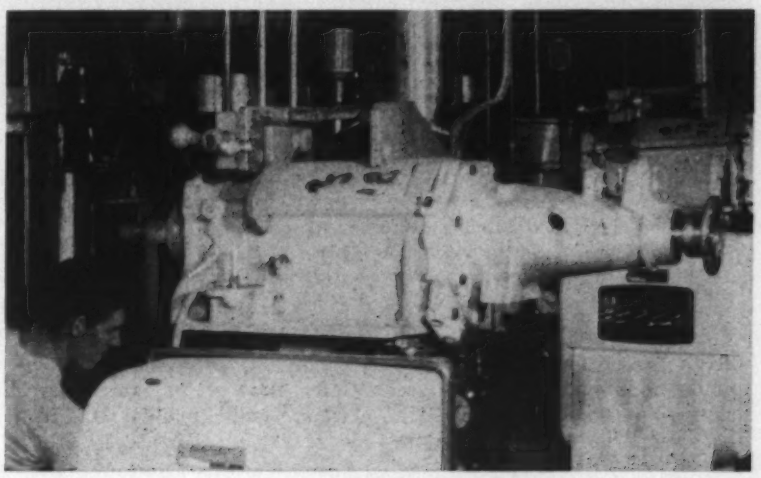
TALK has it that power train engineers are waging heated debates over the best way to link rear mounted transaxles (transmission-differential combinations) to front mounted engines.

One group favors the conventional approach (tubular propshaft and universal joint hookups); the other (including some engineers at Pontiac, Oldsmobile, and Cadillac) leans toward a flexible whipshaft.

If proponents of the whipshaft win out, steel suppliers will face a switch from tubular stock to bars or rounds. Universal joints will be eliminated.

The propshaft hassle is an offshoot of designers' efforts to eliminate the floor pan hump and tunnel brought about by automatic transmissions and propeller shafts. Initially, the transmission and engine were mounted horizontally to the car's chassis. The propshaft ran through a tunnel beneath the seats and was linked to the differential with a simple universal joint.

When transmissions are moved to the rear and . . .



Engines remain in the front of the car

• **Lower, Lower**—Then stylists began to compress cars, and the hump and tunnel grew into obstructions. The next step, in 1957, was to tilt the engine and transmission slightly downward. At the same time, the propshaft was cut into three sections. Each section was linked by a "U" joint. Costs went up. Some engineers say the arrangement increased propshaft vibration and caused a slight power loss to the rear wheels. But it wasn't noticeable in the horsepower race era.

Tilting and jockeying have continued as far as road clearance and car height will permit. In most 1960 models, the hump and tunnel don't seem to be too bothersome to the car buyers, but they still annoy automotive designers. Corvair has eliminated the problem by moving both engine and transmission to the rear.

Few in the industry want to emulate Corvair's approach. They still want the engine up front, but they do like the transaxle idea because it permits a single fluid for differential and transmission. Some designers believe it makes for better weight distribution, particularly in the lighter compacts. This is where the propeller shaft controversy starts.

• **The Shaft**—One side claims

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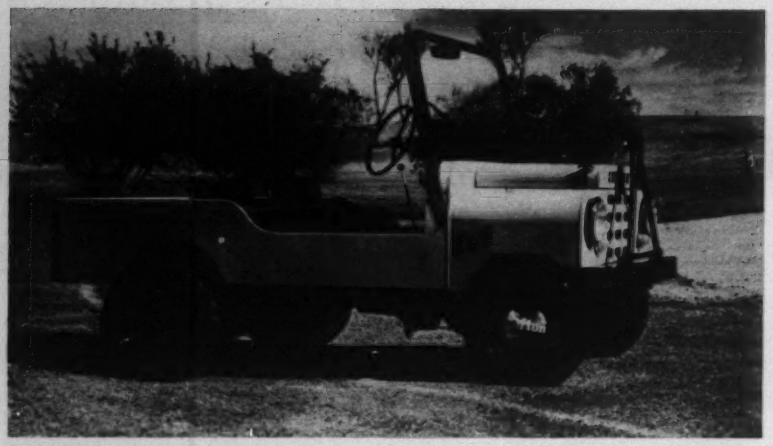


THIS 1100 LB UTILITY CAR manufactured by Crofton Marine Engine Co., San Diego, Calif., is designed primarily for offhighway use. Examples: Golf courses, beaches, and ranches. Wheelbase is 63 in.; length, 105 in.; width, 48 in. It is driven by a 36 hp, liquid cooled, 4 cylinder Crofton engine. Builders claim 30 miles on a gallon of gas and 50 mph with a half-ton payload

there's too much power loss in a tubular propshaft with universal joints when the transmission is in the rear. The consideration is important because of the present trend toward economy engines. They can't spare much horsepower to compensate for power losses in the drive train. The universal joints are bulky and require a small hump or tunnel under the rear seat, a most vulnerable place from the standpoint of seating comfort. Another beef is that conventional propshafts vibrate too much for quiet operation in unitized cars which are hard to soundproof.

The alternative being proposed is a ¾ in. round steel shaft that connects directly to the engine crankshaft. It is hooked onto the transmission's input shaft with a splined coupling. There are no universal joints, but two ball bearings encased in rubber cushions support the shaft. A simple stamped steel housing (or possibly polyvinyl) protects the whip from dirt and damage. The floor pan is flat.

In operating, the whipshaft flexes slightly, purportedly making for less vibration without a loss in power. It's a little like using a single rubber band to power a model airplane instead of two small rubber bands hooked together with a piece of wire. The all-rubber setup unwinds smoothly, but the wire and rubber rig jerks and theoretically loses some of its power through friction at the joints.

• **Rebuttal** — While the flexible shaft appears less costly than the standard setup, it must be centerless ground, shot peened, and the ends upset in a cold header. Opponents reportedly claim flexing can't be controlled, and fatigue life can't be predicted. They also point out that whipshafts have been tried before without success (an early electric car used a flat spring type shaft).

As far as STEEL can learn, the flexible shaft projects aren't far enough along to bring them into production for 1962. But they are under test, and a decision probably will be made this year. If autodom follows its usual pattern, the first transaxles will have tubular propshafts, and the whipshaft (if accepted) will be phased in later.

SAE Gets Tips on Adhesives

Structural adhesives for nonferrous materials got a boost at a meeting of the Society of Automotive Engineers in Detroit this week. Claims: They permit the use of lighter gage metals since the load can be spread over a larger joining area; they can provide a seal as well as a bond; they permit the joining of dissimilar metals without the hazard of galvanic action.

The information comes from a paper by A. Farley Thomson and Albert F. Martin, Minnesota Mining & Mfg. Co., St. Paul.

Some adhesives are being used to bond stiffeners to exterior body surfaces, say Messrs. Thomson and Martin. The stiffeners are bonded to oily metals, and curing is done during the paint cure cycle. Tensile strengths of 200 psi can be maintained. Another application is using the pastes as an adhesive and sealer in joining two stamped halves of a component. The shells are tacked in position with spotwelds, but the adhesive paste in the folds creates the structural bond.

If you're investigating adhesives, the 3-M engineers make these suggestions: "The same considerations must be given to the use of adhesives as are now given to welding, brazing, and other joining methods. Joints should be designed to provide the maximum adhesive area to carry all the load possible. Joints should also be designed to place the adhesive in tensile or shear as much as possible with a minimum of peeling forces. Surfaces must be clean. Heat energy must be brought to the adhesive in an orderly fashion to effectively complete the chemical reaction."

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,757
February	659,323	478,484
2 Mo. Totals	1,345,054	1,024,241
March		576,085
April		578,825
May		546,817
June		557,994
July		555,418
August		239,152
September		258,157
October		507,530
November		254,527
December		494,931
Total		5,593,677

Week Ended	1960	1959
Feb. 6	164,027	114,282
Feb. 13	153,186	115,491
Feb. 20	158,898	120,780
Feb. 27	153,501	127,783
Mar. 5	140,650†	133,540
Mar. 12	148,000*	134,283

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

Vaughn Haynes, right, manager of production engineering, discusses "trap" line scheduling with Wilfred Pascoe, superintendent of press room.

Chrysler blanks strip steel by "trap" shearing on Wean coil processing line

Trapezoidal shearing from coil is, in many cases, the most economical way to prepare blanks for subsequent press operations. Two, independent, pivoting shear heads allow selection of the most economical proportions of the blanks for the finished shapes. This "tailoring" of the material to the end parts eliminates much of the material loss that would result if these same parts were stamped and drawn from square-cut sheets.

Wean has designed and built almost all of the "trap" shear lines used today. The installation shown is at Chrysler Corporation's mammoth Twinsburg, Ohio stamping plant. This Wean coil processing line incorporates strip cleaning, flexing, leveling and shearing operations that turn as-received mill coil into sheet, ready for press work.

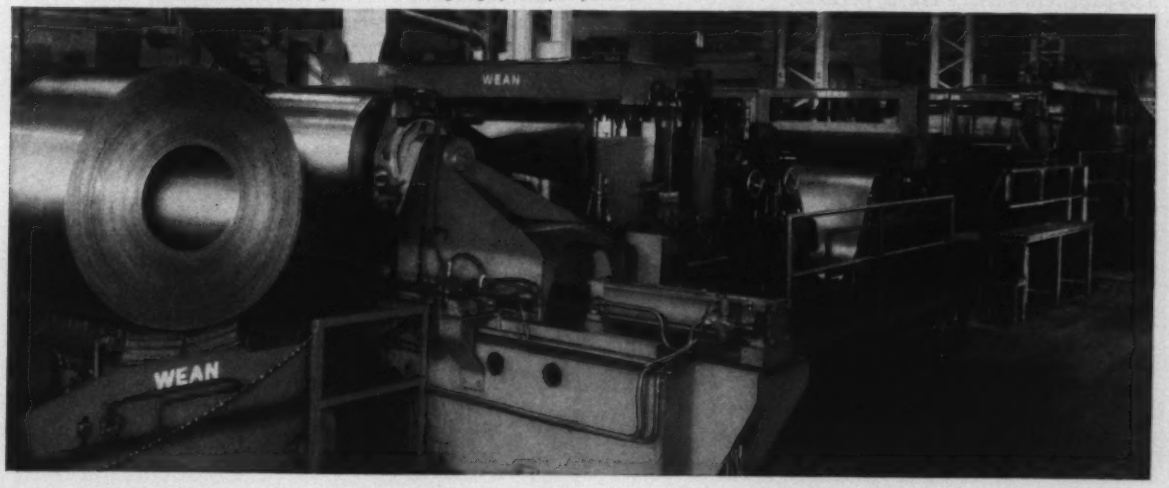
Today, more and more alert metalworking firms are turning to coil processing as one of the answers to rising production costs. If your firm uses approximately 500 tons/month of flat-rolled steel, you may be missing major material and overhead savings if you still purchase in sheet form.

An experienced Wean representative will be able to tell you, or your production executives, if coil processing can cut your costs—and how much. Many firms have amortized the equipment costs involved within one year.

WEAN EQUIPMENT CORPORATION
CLEVELAND 17, OHIO

WEAN

Wean trapezoidal shearing line at Chrysler's Twinsburg Stamping Division plant produces blanks for body stampings from coils weighing up to 30,000 pounds.



Stainless pressure tubing that gets white glove treatment

IF you're thinking of using stainless steel pressure tubing to solve a problem, make sure you get your money's worth. Timken® stainless steel pressure tubing is so carefully made it's literally handled with white gloves. That's typical of the quality that's built-in every step of the way. And you get this high internal quality and excellent surface finish, because:

1. **THE TIMKEN COMPANY** has one of the most modern, best-equipped seamless tube mills in the country.
2. **WE PIONEERED** in producing stainless steel tubing for pressure tube applications.
3. **MANY TECHNIQUES** we use are virtually unique in the steel industry.

Experts handle every production step—melting, piercing, finishing, testing, final inspection. The result is, you get the finest stainless pressure tubing you can buy. Tubing proved by performance in hundreds of applications.

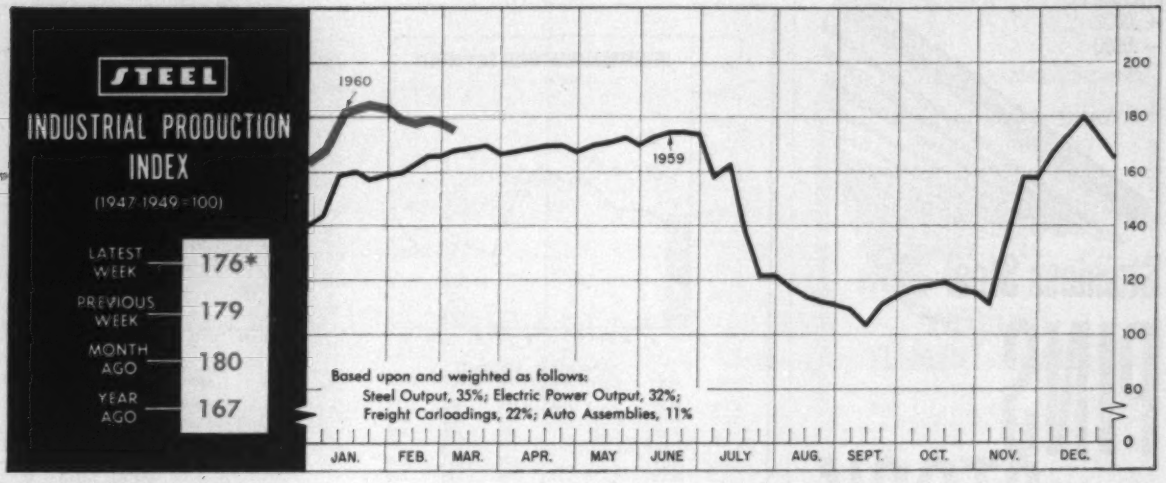
Let Timken Company metallurgical experts help solve your stainless pressure tubing problems. You can get Timken stainless steel pressure tubing in a wide variety of sizes and grades—some not available anywhere else. Get the most for your money. Specify Timken stainless pressure tubing. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.*

WHEN YOU BUY TIMKEN STEEL YOU GET . . .

1. Quality that's uniform from heat to heat, bar to bar, order to order
2. Service from the experts in specialty steels
3. Over 40 years experience in solving tough steel problems

TIMKEN® *Fine Alloy* STEEL

TIMKEN ALLOY STEEL AND SEAMLESS TUBING IS AVAILABLE FROM STEEL SERVICE CENTERS IN 44 CITIES IN THE UNITED STATES



*Week ended Mar. 5.

Indicators Hold Above 1959 Levels

PUBLICITY about the recent weakness in the poststrike boom to the contrary, the economy is still well ahead of where it was a year ago, when a full-fledged recovery was underway. That doesn't mean that everything is just fine, but it does mean that the clouds aren't quite as dark as some observers would have you believe.

Much of the adverse comment about business conditions stems from cutbacks in two industries: Autos and steel. Taken at face value, the two factors are disturbing, but face value is often misleading. If either industry had maintained production at the immediate poststrike rates, the economy would have been in for a tremendous shock later in the year. Cutbacks were inevitable. Now they're coming gradually at a time when the rest of the economy is still in a strong position. Result: The outlook for the rest of the year, and perhaps 1961, is strengthened.

• **Comparisons**—Steel mill operations have been in a gradual decline since late in January. Ingot output has dropped from a weekly 2,727,000 net tons of steel to last week's scheduled 2,647,000 tons. But that's a dip of only 80,000 tons a week over a period of seven weeks. A year ago when consumers were pushing to build stocks in anticipation of the strike, production was 2,604,000 tons. With inventories now at fairly satisfactory levels, the current production of steel is a better indicator of the true strength of the economy than was that of a year ago.

It was inevitable that auto production would have to be cut back as the pipelines filled. With capacity to build about 10 million cars a year, the industry found it was an easier task than many had supposed.

• **Sales Holding Up**—And all the talk about poor car sales should be taken with a grain of salt. They

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,647[1]	2,645	2,604
Electric Power Distributed (million kw-hr)	13,900[1]	14,092	12,945
Bituminous Coal Output (1000 tons)	8,320[1]	7,195	8,551
Crude Oil Production (daily avg—1000 bbl)	7,200[1]	7,318	7,213
Construction Volume (*ENR*—millions)	$505.6	$307.8	$523.3
Auto, Truck Output, U. S., Canada (*Ward's*)	178,498[1]	194,504	166,507
TRADE			
Freight Carloadings (1000 Cars)	585[1]	553	596
Intercity Truck Tonnage (changes from year ago)	−1.6%	+2.9%	+9.0%
Business Failures (Dun & Bradstreet)	277	289	296
Currency in Circulation (millions)[3]	$31,516	$31,562	$31,126
Dept. Store Sales (changes from year ago)[3]	−7%	−2%	+10%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$27,409	$22,276	$25,984
Federal Gross Debt (billions)	$290.7	$290.4	$285.1
Bond Volume, NYSE (millions)	$32.5	$23.3	$40.0
Stocks Sales, NYSE (thousands of shares)	16,240	12,690	20,018
Loans and Investments (billions)[4]	$102.8	$103.0	$103.5
U. S. Govt. Obligations Held (billions)[4]	$25.5	$25.7	$33.4
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	234.4	234.3	220.4
All Commodities[7]	119.4	119.3	119.2
Commodities Other than Farm & Foods[7]	128.5	128.6	127.6

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,844,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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in STOCK
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(precision tolerance)
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- Diams: .0312 through .500
- Lengths: 3/32" through 2½"
- Chamfered ends
- "Specials" manufactured promptly
- Full range raw material on hand

TAPER PINS
(commercial, precision, AN)
- Stainless 18-8, type 303. Also many in type 316 (Commercial tolerance)
- Size: 9/0 through 10 in stock
- Lengths: 3/16" through 8" (not all lengths in all sizes.)
- "Specials" manufactured promptly, any material

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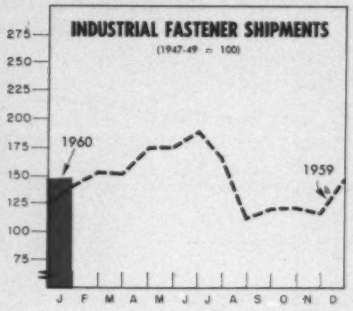
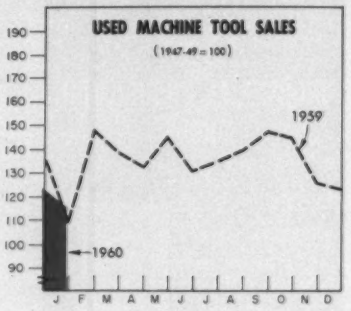
THE BUSINESS TREND



(Seasonally adjusted)

	1960	1959	1958	1957
Jan.	149	140	133	173
Feb.	...	153	117	177
Mar.	...	152	103	166
Apr.	...	175	102	157
May	...	175	111	168
June	...	187	120	162
July	...	165	133	184
Aug.	...	111	120	155
Sept.	...	119	141	159
Oct.	...	120	137	163
Nov.	...	115	134	147
Dec.	...	147	152	140
Avg	...	146	125	162

Industrial Fasteners Institute.
Charts copyright, 1960, STEEL.



	1960	1959	1958	1957
Jan.	115.0	109.5	121.1	n.a.
Feb.	...	148.1	121.9	n.a.
Mar.	...	139.3	106.3	n.a.
Apr.	...	132.9	105.0	152.1
May	...	145.7	99.5	132.6
June	...	131.3	111.9	137.0
July	...	135.3	115.0	125.3
Aug.	...	139.7	93.4	115.6
Sept.	...	147.8	113.6	117.6
Oct.	...	145.2	128.8	108.9
Nov.	...	126.8	122.3	104.5
Dec.	...	123.1	135.2	87.7
Avg.	...	135.4	114.5	128.9

n.a.=not available.
Machinery Dealers National Assn.

are poor only in comparison with overoptimistic forecasts (and the pace in record 1955). For the first two months, dealers' deliveries are holding to the 1957 pattern (the last year in which sales exceeded 6 million cars). The last ten day selling period in February was the best in the 1960 model year.

Indications are that the trend will continue in March. There is a close correlation between new car registrations in Ohio's Cuyahoga County (Cleveland and surrounding territory) and the nation. The county's sales total in the week ended Mar. 5 showed a significant gain over comparable February totals despite the most severe weather of the year. Registrations in the first ten weeks are the highest for any comparable period since 1955.

• **Schedules Strengthen** — In the light of the sales trend, producers are scheduling another heavy month, says *Ward's Automotive Reports*. March output is forecast at 666,000 units. (In shorter February, output was 659,323.) Inventories will reach a record 1.1 million domestic cars by the end of this month compared with 956,000 at the end of February. Industry planners feel they need that much if they are to maintain the current selling rate and still be in good shape for the spring pickup.

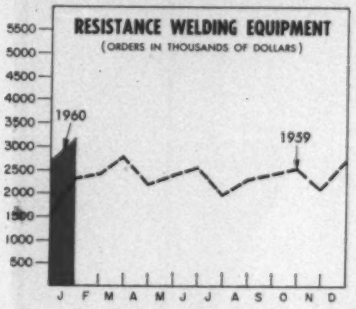
Output in the storm battered week ended Mar. 5 dropped about 13,000 units from the preceding week, but it still was comfortably above the year-ago total.

Weekly Barometers Split

The weekly indicators for industry and trade shown in the Barometers of Business (see box, Page 67) also point to a gain over the 1959 level. In addition to steel and auto production, output of electric energy, and currency in circulation are up, business failures are down.

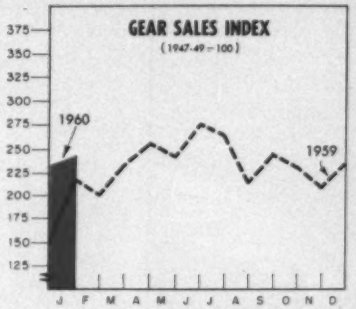
Power distribution has been running better than 8 per cent above 1959 levels. Business failures are averaging ten a week less than they did in the comparable year-ago period. And currency in circulation is up more than $400 million, indicating the healthy state of spending in general.

Four indicators show minus signs for the latest week (coal output, freight carloadings, intercity truck tonnage, and department store sales), but weather has been the big factor against their comparative showings of late. For the year to



	Net Orders		Shipments	
	1960	1959	1960	1959
Jan.	3,258	2,396	1,582	1,427
Feb.	....	2,457	....	1,889
Mar.	....	2,811	....	2,179
Apr.	....	2,258	....	2,193
May	....	2,407	....	2,019
June	....	2,597	....	2,702
July	....	1,980	....	2,269
Aug.	....	2,322	....	2,928
Sept.	....	2,435	....	2,113
Oct.	....	2,599	....	2,097
Nov.	....	2,131	....	1,597
Dec.	....	2,768	....	2,353
Totals	....	29,161	....	25,766

Resistance Welder Manufacturers' Assn.



	1960	1959	1958	1957
Jan.	243.4	218.6	174.5	259.3
Feb.	....	199.9	179.1	239.5
Mar.	....	234.3	173.7	262.4
Apr.	....	255.6	153.2	221.7
May	....	241.0	142.2	263.2
June	....	274.2	173.8	215.9
July	....	262.8	133.3	211.4
Aug.	....	213 3	162.1	225.8
Sept.	....	243 9	170.7	174.9
Oct.	....	230 5	175.9	207.0
Nov.	....	208.7	182.7	165.3
Dec.	....	233.9	145.5	150.8
Avg	....	234.7	163.9	216.4

American Gear Mfrs. Assn.

date, all four are ahead of their 1959 paces.

Two indicators are at a standoff in the latest weekly tabulations, but cumulative 1960 totals for both construction contract awards and crude oil production are ahead of the 1959 figures.

Monthly Indicators Well Ahead

The monthly business statistics shown regularly in this column (four are seen on Pages 68-69) weigh heavily in favor of 1960 over 1959. January information is available for 19 of them, and 14 show marked improvement over their year-ago status.

Buyers Note Softening

Purchasing agents still report that business is good, but they feel that the "widely predicted boom that was to launch the 'sizzling sixties' has not yet materialized," declares the National Association of Purchasing Agents. Only 24 per cent of the respondents to the association's monthly business survey indicate production is up from the prior month. Thirteen per cent report production is off.

Significant to the future is the response of the 25 per cent who said new orders were coming in at a slower rate—only 17 per cent so reported a month earlier. However, 28 per cent (compared with 41 per cent earlier) still see orders coming in at a faster rate.

Ninety-one per cent said that high interest rates have had no effect on plans for capital spending.

Trends Fore and Aft

• "Our transistor business more than doubled in 1959 and is expected to double again in 1960," states James M. Skinner Jr., president of Philco Corp., Philadelphia.

• Union Pacific Railroad Co. ordered $26 million worth of rolling stock last week. It will build 500 flatcars and insulated boxcars in its own shops; Pullman-Standard Car Mfg. Co. will build 150 covered hopper cars and 200 gondolas; Gunderson Bros. Engineering Corp. will build 200 gondolas; Budd Co. will make 20 reclining seat coaches; and ACF Industries will build 25 baggage cars.

• Total consumer credit rose $463 million in January to a new high of $51.356 billion. The biggest gain, seasonally adjusted, was $149 million in auto paper.

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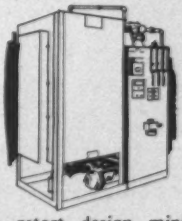
Atmosphere Equipment Specialist, reports . . .

GAS GENERATOR ON LINE OVER 9000 HOURS WITHOUT ELEMENT CHANGE

C. I. Hayes Type IGL-1004 Endothermic Gas Generator installed at a nationally-known mold die firm* has been operating at 1850°F on a steady cracking process for over 9000 hours without change of heating elements. Why such outstanding performance?

Rugged Construction and Good Design provide extra life insurance. A new Hayes retort assures maximum utilization of catalyst. Straight-



through retort design minimizes downtime due to catalyst change. On this installation, catalyst was changed in less than 3 hours. Original catalyst lasted 4800 hours . . . even better service is expected of the recharge.

New Ceramic Heating Elements — having practically constant resistance — add extra months of service life. Elements can be connected directly across the line . . . need no tap transformers . . . are easily replaced without shutting down the generator. Here's real economy!

Wide-Range Flexibility and Precise Control are the mark of the Hayes IGL-1004. This "endo" generator can supply low *or* high carbon-potential atmospheres for jobs like copper brazing, annealing of steel, sintering of iron compacts, carbonitriding, etc. Wide span heating provides reserve capacity. Flexibility of temperature range — especially at higher ranges — can be utilized to the maximum . . . for maximum output at lowest dewpoints without fear of burn-out.

Bulletin 5808A gives all facts on IGL-1004. Write for your copy today.

*Name of installation on request

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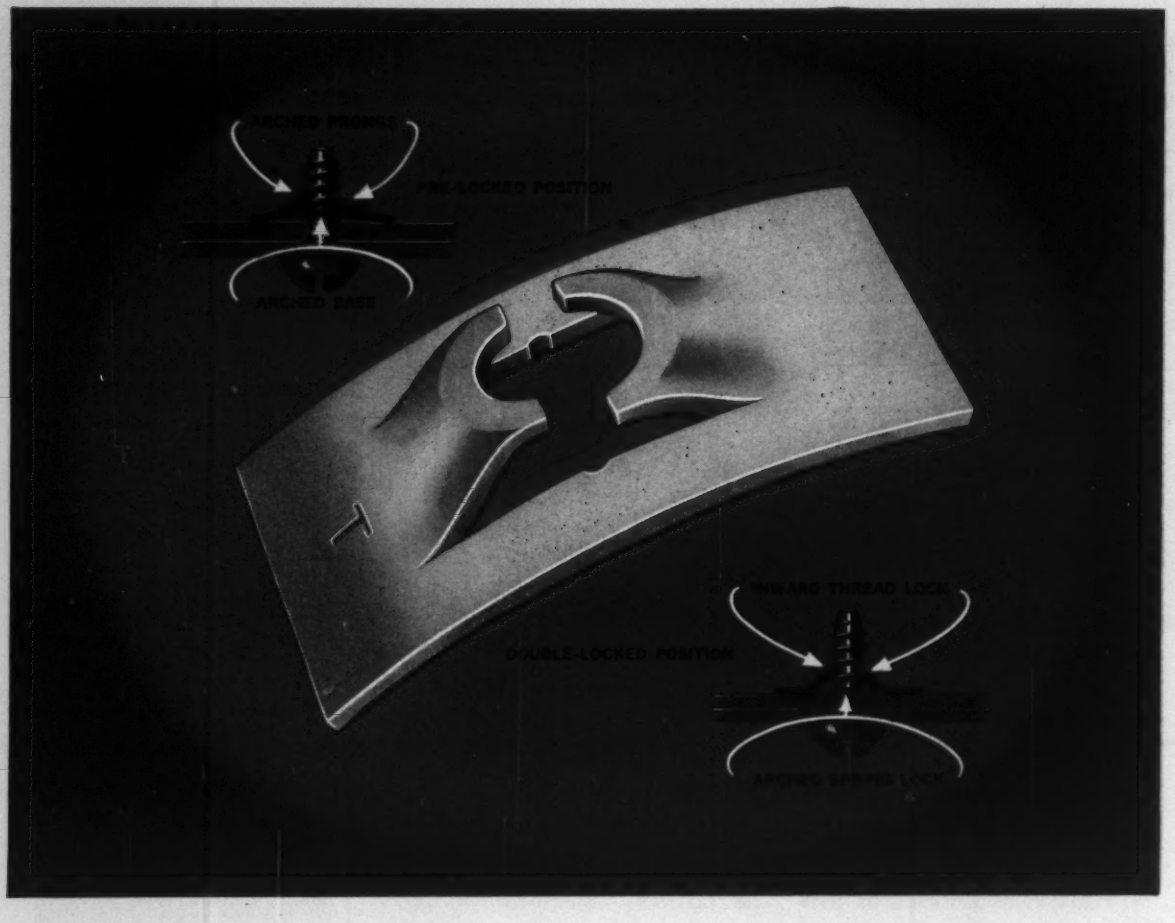

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Self-locking **SPEED NUT®** goes on fast, never shakes loose...and reduces costs!

With only one piece to handle, you can quickly position this Tinnerman Flat-Type SPEED NUT in screw-receiving position in one motion. No threaded nuts, no lock washers, no spanner washers to worry about.

Drive the screw and this spring-steel fastener locks tight, never to shake loose; yet easy to remove and reuse whenever you desire. SPEED NUTS won't freeze on screw threads!

Tinnerman Flat-Type SPEED NUTS are made in a full range of sizes, tensile strengths and corrosion-resistant finishes. Design variations also provide many multiple-function special types.

Lower cost per thousand plus lower cost of assembly give you maximum cost-reduction benefits... with maximum fastening assurance.

For more information, refer to your Sweet's Product Design File, section 7-Ti. Your Tinnerman representative has samples and prices. He's listed under "Fasteners" in the Yellow Pages. Or write to:

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JOSEPH SURMACZ
Harnischfeger plant mgr.

JOHN F. BRAMHAM
Automotive Materials exec.

PHILIP J. MONAGHAN
GM manufacturing staff v. p.

HARRY G. HOWELL
Champion Div. gen. mgr.

Joseph Surmacz was made plant manager, **Harnischfeger Corp.**, West Milwaukee, Wis. **David Drewery** was made director of production and industrial engineering. **Robert Over** was made superintendent of machine shops, heat treat, salvage, and cutoff departments.

William D. Black was made assistant to the vice president in charge of domestic and foreign material handling operations for **Yale & Towne Mfg. Co.**, New York. He was assistant general sales manager of Yale & Towne's Automatic Transportation Co., Chicago division.

Donald A. Benbow was made sales manager, **Airaterra**, Glendale, Calif.

Warren R. Carter, former works manager, York Div., Decatur Works of Borg-Warner Corp., was made manufacturing manager, **Sealed Power Corp.**, Muskegon, Mich.

James E. Heath was named director of manufacturing, Mechanical Div., **General Mills Inc.**, Minneapolis.

Charles D. Gabor was appointed chief engineer of **Harbison-Walker Refractories Co.**, Pittsburgh.

Ralph D. Whittier was made works engineer of **AC Spark Plug Div.**, Flint, Mich., General Motors Corp. He succeeds **Dale Bachtel**, new AC manufacturing manager. Named to succeed Mr. Whittier as business manager and superintendent of defense manufacturing for AC in Flint is **Albert E. Gasvoda**, former supervisor of material handling.

John F. Bramham was appointed vice president of **Automotive Materials Corp.**, Detroit, and general manager of Pilgrim Drawn Steel Div., Plymouth, Mich. He succeeds the late **Ray E. Lawler**. Mr. Bramham was division sales manager.

Philip J. Monaghan was made vice president in charge of the manufacturing staff, **General Motors Corp.**, Detroit, in addition to his present responsibility as vice president in charge of the process development staff.

Richard W. Little was made manager of purchasing, Supplies Div., **International Business Machines Corp.**, New York.

Ford Motor Co., Dearborn, Mich., established a Defense Products Group under direction of **Gerald J. Lynch**, company vice president and general manager of the Aeronutronic Div.

Charles Locke was elected vice president of **Crucible Steel Casting Co.**, Lansdowne, Pa. He was president, Crucible Steel Casting Co., Cleveland, division of Consolidated Foundries Inc.

Judson S. Sayre was elected chairman and chief executive officer, **Norge Div.**, Borg-Warner Corp., Chicago. Former Norge president, he is succeeded by **Robert H. Quayle Jr.**, former executive vice president. **Harold P. Bull** was made vice president and assistant to the president. He was vice president-sales and is succeeded by **Walter C. Fisher**, director of marketing.

Harry G. Howell was appointed general manager, **Champion Div.**, Cleveland, Steel Improvement & Forge Co. He joined the company a year ago following five years as a consultant to a number of companies in the forging industry.

Erie Malleable Iron Co., Erie, Pa., appointed **R. W. Griswold** president-general manager, **P. H. Vincent** chairman, **B. H. Scott** vice president-sales.

At Ft. Worth, Tex., **Convair Div.**, General Dynamics Corp., named **H. C. Jones** manager of material. He is succeeded by **Jack Haynes** as chief of manufacturing control. Mr. Jones succeeds **S. E. G. Hillman**, promoted to director of procurement and material for Convair in its general offices in San Diego, Calif.

Herman H. Kremer was elected vice president-sales, **Chase Brass & Copper Co. Inc.**, Waterbury, Conn., subsidiary of Kennecott Copper Corp. **Walter E. Evans** was named assistant to the president; **Paul M. Thomas** general sales manager. Mr. Kremer succeeds **G. B. Moseley**, resigned.

R. A. Prosser was made director-marketing and sales; **W. D. Halloran** general sales manager for **Duriron Co. Inc.**, Dayton, Ohio.

William R. Meoli was appointed vice president-sales manager of **Veeco Vacuum Corp.**, New Hyde Park, N. Y.

Thomas E. Pickering was made

RICHARD G. NOLTE T. W. KRUEGER CLEIGHTON HILBERT

Duff-Norton executive promotions

manager-commodity steel sales, **Firth Sterling Inc.**, Pittsburgh.

Joseph B. Rice Jr., former director of manufacturing, ElectroData Div., Burroughs Corp., Detroit, was named general manager of the new **ElectroData Mfg. & Engineering** Div., Pasadena, Calif.

Standard Steel Corp. promoted **Robert F. O'Neill** to manufacturing manager of its Cambridge Div. at Lowell, Mass. Formerly quality control manager, he now is responsible for all phases of the actual plant production of cryogenic equipment manufactured at Lowell. **Thomas F. Duff Jr.** was named to head the Quality Control Dept. at the division.

Charles B. Tansley was made vice president-sales, **Harrington-Wilson-Daum Corp.**, Mt. Vernon, N. Y. He formerly was president of Bryant Machinery Co., Chicago. **C. Morgan Newbury** was made assistant general manager.

Duff-Norton Co., Pittsburgh, promoted **Richard G. Nolte** from vice president-general manager to executive vice president. **T. W. Krueger** was promoted from general sales manager to vice president and general sales manager. **Cleighton Hilbert**, former general manager, Coffing Hoist Div., Danville, Ill., was named vice president-manufacturing.

Gordon Parrington was made plant superintendent, Dearborn, Mich., **American-Standard Industrial Div.**, American Radiator & Standard Sanitary Corp.

Robert R. Hayward was made assistant works metallurgist at the Cleveland Works of **Jones & Laughlin Steel Corp.** He was strip mill metallurgist at the Pittsburgh Works.

Lyman E. Newton was elected executive vice president of Chain Belt Co.'s subsidiary, **Chain Belt (Canada) Ltd.**, Toronto, Ont. He is succeeded as controller of the company in Milwaukee by **Henry L. Fjellman.**

Jesse Stitzer was made engineering manager, **Sorensen & Co.**, South Norwalk, Conn., subsidiary of Raytheon Co. He was manager of the Sorensen High Voltage Systems Laboratory.

Bruno J. Pawlowski was appointed engineering marketing manager, **Gabriel Electronics Div.**, Millis, Mass., Gabriel Co. He was chief engineer.

John C. Nelson Jr. was named production control manager of all marine, industrial, and mining equipment manufacture at **Lake Shore Inc.**, Iron Mountain, Mich.

W. R. Timken, chairman of the finance committee of **Timken Roller Bearing Co.**, Canton, Ohio, becomes acting president to succeed **D. A. Bessmer** who retires as president because of ill health.

John W. Becker was elected a vice president of **National-Standard Co. of Canada Ltd.**, Guelph, Ont. He continues as manager of the company, subsidiary of National-Standard Co.

Alvin H. Storch Jr. was made manager-engineering sales, Industrial Products Group, **Crane Co.**, Chicago. He was general sales manager of Chicago Pump Co.

George W. La Salle was named vice president-engineering, **Hercules Motors Corp.**, Canton, Ohio. **Lawrence G. Downey** was named vice president-sales.

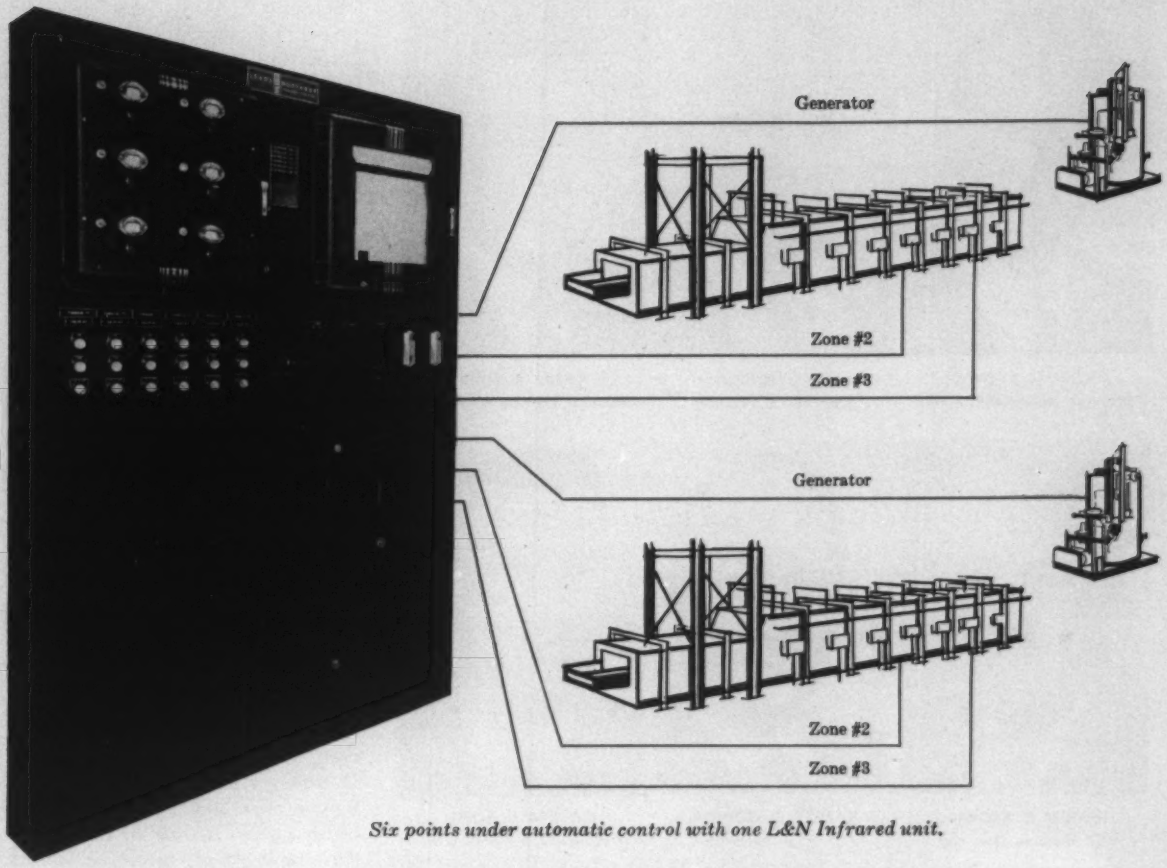
Morton R. Hunter Jr. was elected

CHARLES B. TANSLEY
Harrington-Wilson-Daum v. p.

ROBERT F. O'NEILL
Standard Steel div. mfg.

LYMAN E. NEWTON
Chain Belt (Canada) exec.

GEORGE W. LA SALLE
Hercules Motors eng. v. p.



Six points under automatic control with one L&N Infrared unit.

New L&N Infrared Analyzer Package automatically holds furnace and generator atmospheres "in line"

The L&N IR Analyzer equipment for automatic control of heat treating atmospheres offers five outstanding advantages.

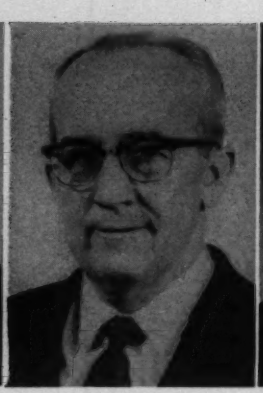
- *It is rugged, reliable and easy to operate.*
- *It is a completely assembled package with all necessary "hardware" panel mounted, piped and wired.*
- *Each unit may be calibrated for either CO, CO_2 or CH_4.*
- *Calibration is accurate and positive . . . requires only three minutes, on-the-spot.*
- *Generator and furnace atmospheres of as many as six points taken from any location in your heat treat can be controlled by one unit.*

This new package of the time-proven L&N IR Analyzer, designed specifically for metallurgical use, is now automatically controlling atmospheres in a number of well known metalworking plants. It has earned the respect of management and operating personnel alike for its accuracy, dependability and ease of maintenance.

For more information request Folder N-91-620(1) from your nearest L&N office or write 4957 Stenton Ave., Phila. 44, Pa.

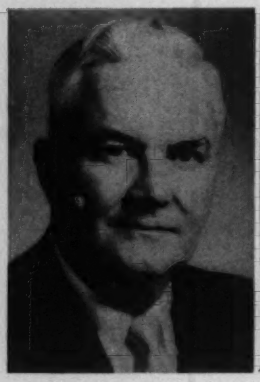
LEEDS Instruments LN NORTHRUP Automatic Controls · Furnaces

THEODORE E. DANN
Pittsburgh Metallurgical post



C. E. HITCH
F. Jos. Lamb mfg.-mgr.

CURRY E. FORD
National Carbon marketing



ROBERT T. BROWN
M&T Welding Div. mgr.

HARVEY C. HOPKINS
ACF v. p.-purchasing

RICHARD E. BOWE
McConway & Torley pres.

executive vice president of **Hunter Machinery Co. Inc.**, Milwaukee.

Robert T. Brown was made manager of the Welding Div. of **Metal & Thermit Corp.**, New York. He replaces **A. J. Fisher Jr.**, recently made executive vice president of M&T. Mr. Brown was sales manager of the division.

Metals Div., **Kelsey-Hayes Co.**, New Hartford, N. Y., appointed **John G. Ziemann** chief metallurgist, in charge of production metallurgy. He was assistant chief metallurgist.

Harold H. Dice was made general manager, **Allison Div.**, Indianapolis, General Motors Corp. He succeeds **E. B. Newill**, retired.

James E. McDonald was made manager-mechanical and pressure tubing products for U. S. Steel Corp.'s **National Tube Div.**, Pittsburgh.

E. J. Bligard was appointed manufacturing manager, **MB Electronics**, New Haven, Conn., division of Textron Electronics Inc.

Harvey C. Hopkins was elected vice president-purchasing of **ACF Industries Inc.**, New York. He served as president of King Container Corp.

Richard E. Bowe, secretary-treasurer, was elected president and treasurer of **McConway & Torley Corp.**, Pittsburgh. **Grover L. Michael**, former president, retired, but remains as a director of Ellicott Machine Corp. of Baltimore, parent corporation. **Donald Y. Clem**, executive vice president, was also elected to the office of secretary.

Bernt T. Nordfjord was made director of sales, **Beaver Tool & Engineering Corp.**, Gaylord, Mich. He succeeds **J. Tom Maidens**. He is assisted by **Roy H. Flones**. **David D. Dresback** replaces **Raymond Nixon** as chief engineer. Mr. Nixon has requested an extended leave of absence.

William V. Wilson was named assistant director of purchases, **Maytag Co.**, Newton, Iowa. He succeeds **R. S. Trevethan**, retired.

Theodore E. Dann was appointed general superintendent of the Charleston, S. C., plant of **Pittsburgh Metallurgical Co.** He succeeds **Adm. Laurance T. DuBose** (U. S. Navy, ret.), who continues with the company as a consultant. Mr. Dann was general superintendent of the Calvert City, Ky., plant.

C. E. Hitch was made manufacturing manager at **F. Jos. Lamb Co.**, Detroit, responsible for all manufacturing activities at Lamb and at FabriTec, a subsidiary producing parts handling equipment.

Curry E. Ford was named director of marketing for **National Carbon Co.**, New York, a division of Union Carbide Corp. He was new products marketing manager. Reporting to Mr. Ford are **James King Jr.** as manager-electrode products, **A. W. Wolff** as manager-industrial carbon products, **W. C. McCosh** as manager-carbon products, and **W. G. Pitt** as manager-new product market development.

Arthur W. Bull was elected chairman, **Michigan Wire Cloth Co.**, Detroit. He assumes this post to lighten operational responsibilities of his father, **Arthur A. Bull**, president and chief executive officer, who is recovering from an aircraft accident. **Alfred P. M. Cochrane**, former vice president, was made executive vice president and continues as treasurer.

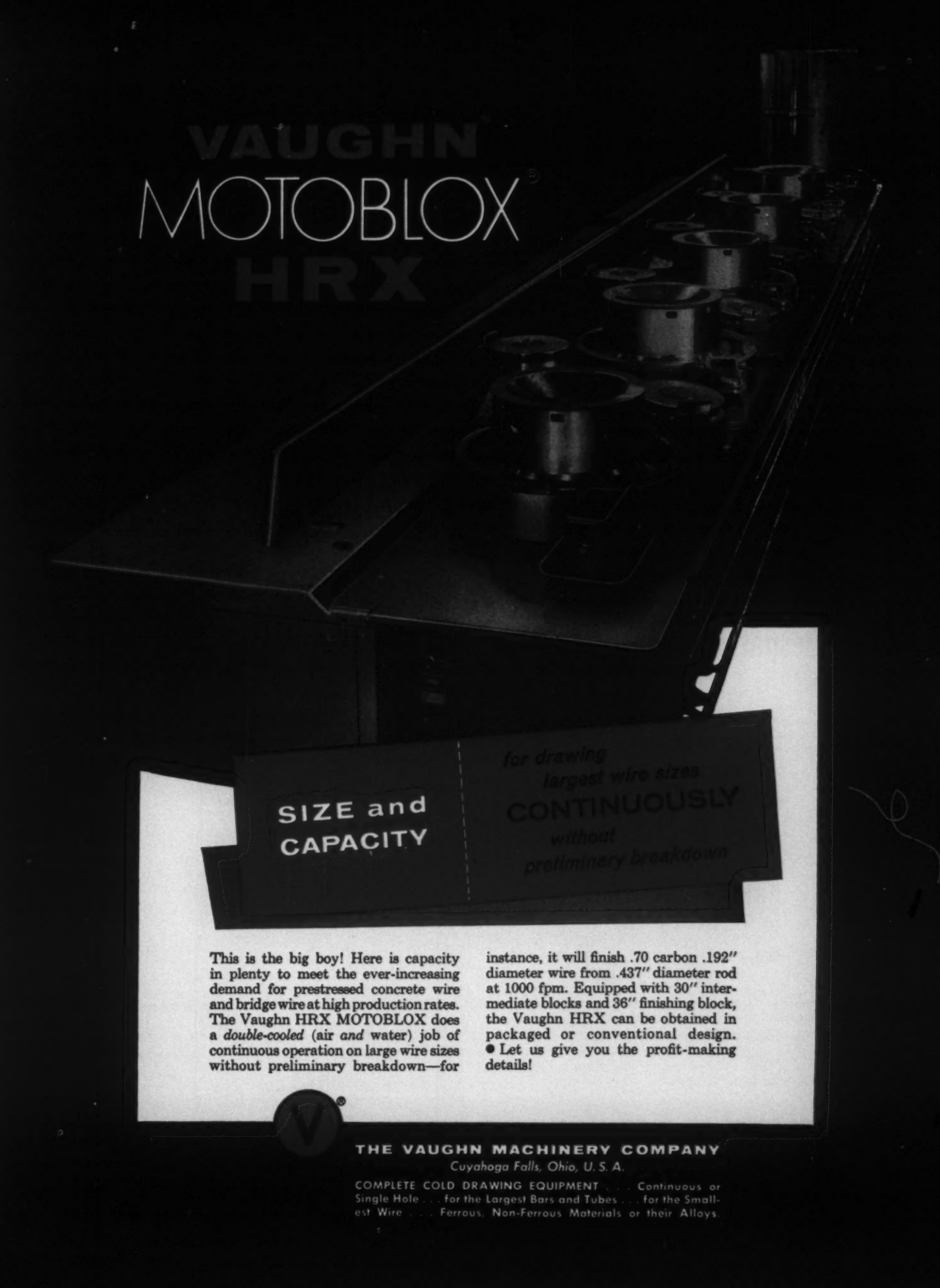
Dr. Herman Blumenthal joined **Chromalloy Corp.**, White Plains, N. Y., as research director of the Chromalloy Div. He was with American Electro Metal Div., Firth Sterling Inc.

Sydney Shrage and **Andrew J. Kubica** joined the staff of Power Systems Product Development, Tapco Group, **Thompson Ramo Wooldridge Inc.**, Cleveland. Mr. Shrage was named senior project engineer, and Mr. Kubica will serve under him as an engineering specialist.

OBITUARIES...

Howard C. Waldron, 55, assistant works manager, **Nordberg Mfg. Co.**, Milwaukee, died Feb. 27.

Joseph A. Coleman, vice president and treasurer, **Madison-Kipp Corp.**, Madison, Wis., died Feb. 25.



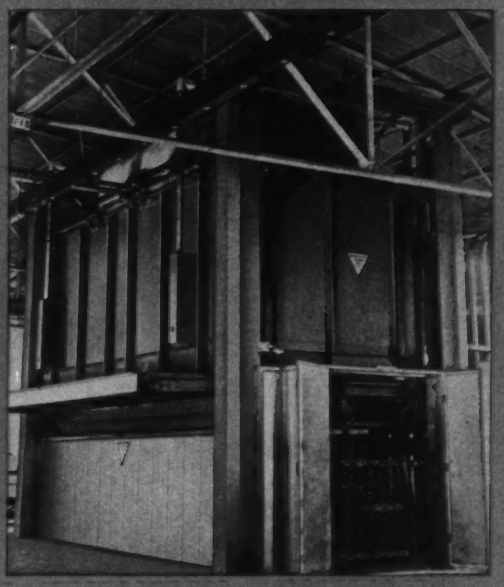
This is the big boy! Here is capacity in plenty to meet the ever-increasing demand for prestressed concrete wire and bridge wire at high production rates. The Vaughn HRX MOTOBLOX does a *double-cooled* (air *and* water) job of continuous operation on large wire sizes without preliminary breakdown—for instance, it will finish .70 carbon .192" diameter wire from .437" diameter rod at 1000 fpm. Equipped with 30" intermediate blocks and 36" finishing block, the Vaughn HRX can be obtained in packaged or conventional design. ● Let us give you the profit-making details!

THE VAUGHN MACHINERY COMPANY

Cuyahoga Falls, Ohio, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

a DESPATCH results furnace will give from A356-al. alloy

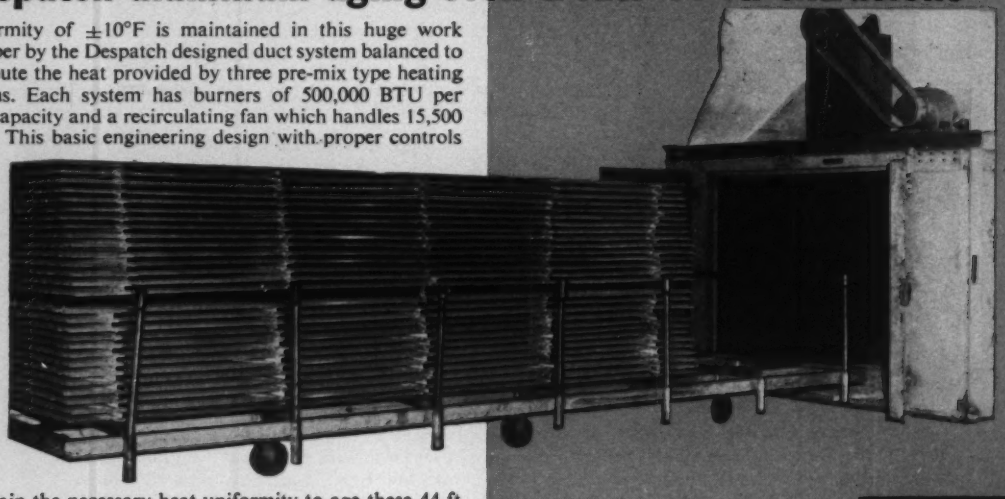


Where best mechanical properties are required from A356 aluminum castings, heat treatment should follow definite time at temperature programs. Careful adherence to quenching time and quench temperatures will alter tensile strength and elongation. Heat treating furnaces by Despatch achieve temperature uniformity in the work chamber to minimum tolerances. Quenching time and quench temperature can be controlled to fit the metallurgical program required. Despatch engineers have built aluminum furnaces to the requirements of major aluminum producers and fabricators through all stages of aluminum industrial development.

Despatch developed furnace features now make possible the proper heat treatment of A356 al. alloys. Check Despatch for the correct furnace for all of your aluminum and aluminum alloy heat treating requirements.

Despatch aluminum aging oven treats 44 ft. extrusions

Uniformity of ±10°F is maintained in this huge work chamber by the Despatch designed duct system balanced to distribute the heat provided by three pre-mix type heating systems. Each system has burners of 500,000 BTU per hour capacity and a recirculating fan which handles 15,500 CFM. This basic engineering design with proper controls



maintain the necessary heat uniformity to age these 44 ft. extrusions to specification in minimum time.

For any al-mg alloy heat treating requirements we invite your inquiry. A Despatch engineer will give prompt service to your particular heat treatment problem and recommend a furnace design for the job.

PIONEERS IN ENGINEERING
HEAT APPLICATIONS
FOR INDUSTRY

DESPATCH OVEN CO.

DESPATCH OVEN COMPANY

619 SOUTHEAST 8TH STREET • MINNEAPOLIS 14, MINNESOTA

Wheeling Steel to Spend $8 Million on Ohio Plants

WHEELING STEEL CORP., Wheeling, W. Va., will spend $8 million this year to expand and improve its facilities in Ohio. The firm announced a $5.7 million program last month for plants and facilities in West Virginia (STEEL, Feb. 15, p. 106). Wheeling's expenditures for capital improvements in 1959 totaled $14 million.

William A. Steele, president, says the Ohio project "will improve customer service, increase operating efficiency, enlarge blast furnace capacity, and provide facilities for a higher steelmaking capacity." The program includes:

• **Steubenville Works**—One of the five blast furnaces will be rebuilt and enlarged. Daily capacity of the furnace will be increased from 850 tons of pig iron to 1150 tons. Cost: $2.7 million.

To meet increased blowing engine capacity, a $1.5 million turboblower installation is planned. An oxygen pipeline from the South Div. to the North Div. is being built. Construction of the large diameter line and other preparatory work for the oxygen generating plant at the South Div. will cost over $1 million. The $6 million oxygen plant being built at Mingo Junction, Ohio, is expected to be in operation in the fall.

The bessemer converters are being altered to permit blowing with a mixture of steam and oxygen instead of air.

The change in the steelmaking process at Steubenville South and improvements in open hearth practice at Steubenville North are expected to increase Wheeling's rated annual steelmaking capacity to about 2.5 million tons from the present 2.4 million tons.

New soaking pits and railroad track changes at the Steubenville Works will cost about $1.5 million. This will permit improved operations at the plant's 66 in. hot strip mill.

• **Yorkville Works** — Recoilers are being installed on an electrolytic tinning line to meet the growing demand for tin plate in coils. Estimated cost: $900,000.

In addition to improvements announced for this year, the company has long range plans for the next several years which are "designed to substantially increase Wheeling's steel producing capacity and develop new products," Mr. Steele adds.

Doubles Sinter Capacity

Dravo Corp., Pittsburgh, is erecting a second sinter plant at the Trenton (Mich.) Works of McLouth Steel Corp., Detroit. The new plant will have a daily capacity of 2100 tons and will duplicate the Dravo-Lurgi installation placed in operation last year at Trenton.

Forms Canadian Subsidiary

Robotron Corp., Detroit, manufacturer of industrial electronic control systems, established a subsidiary, Robotron of Canada Ltd., Sandwich West (Windsor), Ont. The Canadian plant covers 5000 sq ft.

Kaman Aircraft Builds

Kaman Aircraft Corp., Bloomfield, Conn., is constructing a series of buildings that will bring together under one roof the two existing buildings in the rear of the present engineering and administration building. The addition will add 41,000 sq ft of floor space, making the total 826,000 sq ft.

Kropp Forge Co. Grows

Kropp Forge Co., Chicago, acquired the job forging operations of Giant Grip Mfg. Co., Oshkosh, Wis. The acquisition includes about 500 active steel forging dies. Kropp also announces receipt of a major forging contract from Crane Co., Chicago, which recently discontinued its forging operations. Other forging companies were in-

(*Please turn to Page* 80)

To meet demands for perfect finish on stainless and nickel Thinstrip®, Somers installs unique new annealing furnace.

This new Selas vertical continuous annealing furnace assures uncontaminated, commercially unmarred surfaces as well as uniform temper and faster delivery on stainless, nickel and nickel alloy Thinstrip up to 25" wide. But this is only part of the story of Somers' quality. Sendzimir rolling mills, Accu-Ray gauging plus 50 years leadership in thin gauge metals (from .010 down to .000125") are a few of the features Somers offers to assist you with your Thinstrip® problems.

Write for Confidential Data blank — no cost or obligation.

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Somers

Somers Brass Company, Inc.

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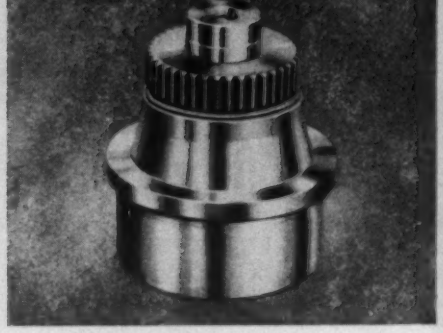
UNBRAKO

INDUSTRIAL FASTENERS like this Socket Head Cap Screw are produced to a dynamic reliability standard as a result of SPS research. The SPS line includes a limitless variety of self-locking screws, locknuts and precision fasteners for everything from massive machinery to the most minute products.

SPS AIRCRAFT

AIRCRAFT/MISSILE FASTENERS like this bolt are produced to ultra-high performance standards at SPS. Today's lightest, strongest fasteners in standard and special designs are products of SPS. Research and development work includes titanium, beryllium and other light-weight, high-strength exotic metals.

SPS NUCLEAR



NUCLEAR COMPONENTS like this cap for a core housing are held to almost unbelievable dimensional tolerances. The nuclear energy field depends on SPS for threaded fasteners, control rod drive mechanisms, motor tubes, core components, instrumentation housings and many other essential parts.

SPS RESEARCH is

Photoelastic study on a Polariscope in the SPS Laboratory for advanced research proves that new UNBRAKO *Hi-Life Thread Root distributes stresses evenly over a large, smooth radius, doubling fastener fatigue life and increasing tensile strength.*

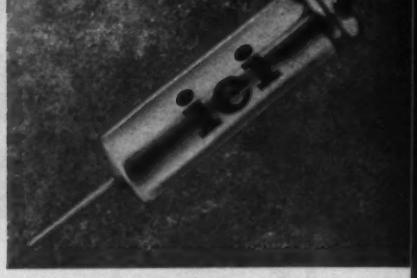
HALLOWELL

SHOP EQUIPMENT for industry and schools is made to the same superior quality standards as other SPS products. The Hallowell line offers broad coverage of standard and special needs in work benches, shelving, and similar equipment. Ruggedness and space efficiency are well identified with Hallowell.

COLUMBIA

OFFICE FURNITURE like this handsome Columbia Nine-to-Five unit sets an office apart with distinctive styling and color combinations. The complete line includes efficiently designed, durable steel office furniture, plus special units, a wide choice of smart chairs, filing cabinets and accessories.

I. E. I.



CAPACITORS FOR ELECTRONICS bearing the IEI trademark are widely used for subminiature circuitry and transistorized applications. This SPS company makes both aluminum and tantalum capacitors, including the lightest and smallest per given capacitance in the industry, to the highest quality standards.

rewriting the book on threads

Out of the SPS laboratory has come a whole new concept in thread design. Engineers created a radiused thread root based on known laws of stress. A precision contour now eliminates sharp corners, or "hot spots", where stress concentration formerly caused fatigue cracks. The streamlined root provides a smooth pattern of stress distribution.

The reliability of this research-inspired thread root is achieved directly on the production line. SPS makes and maintains its own thread roll dies. Skilled machine operators check die performance as often as every 50 pieces.

Gauges at production stations are calibrated daily against standards set by the SPS Metrology system . . . industry's most advanced thread control facility.

UNBRAKO socket screws . . . the advanced fastener for the '60's . . . are but one outstanding example of the tireless SPS effort to create reliability through research. Born in the laboratory . . . formed to strict production quality standards . . . these improved fasteners are now in use throughout industry.

This is SPS reliability at work for you. Write for a 20-page booklet called, "The Root of the Thread", which presents a comprehensive description of this development.

SPS

where reliability replaces probability

STANDARD PRESSED STEEL COMPANY, Jenkintown, Pa. • SPS Western, Santa Ana, Calif. • The Cleveland Cap Screw Company, Cleveland, O. • Columbia Steel Equipment Div., Fort Washington, Pa. • International Electronic Industries, Inc., Nashville, Tenn. • National Machine Products Div., Utica, Mich. • Standco Canada, Ltd., Toronto, Canada • Unbrako Socket Screw Co., Limited, Coventry and Sheffield, England • Unbrako Schrauben GmbH, Dusseldorf and Koblenz, W. Germany.

FORMULA FOR TOMORROW

DETROIT

THE MACHINE TOOL EXPOSITION - 1960

INTERNATIONAL AMPHITHEATRE

CHICAGO, ILLINOIS

SEPTEMBER 6-16

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION

MMT=PE

WEST

(*Concluded from Page 77*)

volved in the remainder of the Crane contracts.

Builds Shell-Mold Foundry

T. B. Wood's Sons Co., Chambersburg, Pa., has completed construction of a shell-mold foundry to supplement existing facilities. Individual castings range from 1 to 45 lb. Both cast iron and Ductile iron are poured. Equipment includes two fully automated shell-molding machines.

Jacobsen Buys M-F Plant

Jacobsen Mfg. Co., Racine, Wis., has purchased a 400,000 sq ft plant from Massey-Ferguson Inc. to replace its present quarters. The firm is primarily a producer of power mowers.

J&L to Get 20 Ladles

Pennsylvania Engineering Corp., New Castle, Pa., has received an order for twenty 230 ton ladles for Jones & Laughlin Steel Corp.'s Cleveland Works, which is being expanded. The order was placed by Koppers Co., Pittsburgh, prime contractor for the project. It includes 15 teeming ladles and five hot metal ladles.

Buys Optical Gaging Line

Ex-Cell-O Corp., Detroit, purchased Eastman Kodak Co.'s contour projector business. The optical gaging instrument permits dimensional inspection of precision parts. An enlarged image of the part is projected on a screen.

Plans Container Plant

Western Shipping Containers Ltd. will build a $500,000 plant at Camrose, Alta. Annual capacity will be about 1 million metal containers, such as drums, pails, and kegs.

Joins Curtain Wall Units

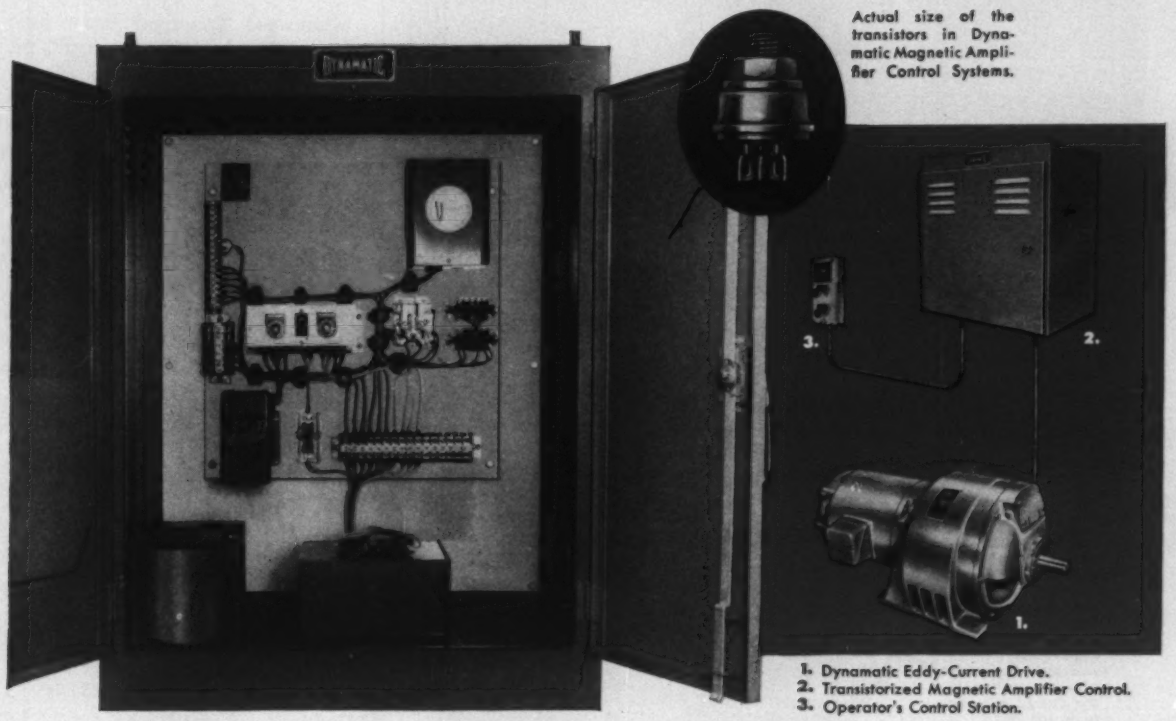
Reynolds Metals Co., Richmond, Va., has centralized all aluminum curtain wall sales and manufacturing activities in its Architectural Fabricating Div. E. J. Tangredi is director of curtain wall sales and manufacturing for the division. Ru-

NEW RELIABILITY!

DYNAMATIC®

MAGNETIC AMPLIFIER (TRANSISTORIZED) CONTROL SYSTEMS

for Eddy-Current Rotating Equipment



1. Dynamatic Eddy-Current Drive.
2. Transistorized Magnetic Amplifier Control.
3. Operator's Control Station.

DYNAMATIC Transistorized Magnetic Amplifier Control Systems are based on a new principle using rugged electrical components designed to provide many times the life of components used in electronic speed control systems. Transistors, reactors, and silicon rectifiers take the place of vacuum tubes; there are no wearing parts to require maintenance, adjustment, or replacement. These transistorized controls are ideal for installation in remote areas and for unattended operation.

Used in combination with Dynamatic Eddy-Current Drives, Transistorized Magnetic Amplifier Controls provide infinite speed adjustment and accurate control for almost any application from five through 10,000 horsepower. Three essential components—drive, push-button station, and magnetic amplifier control—make up the Dynamatic Drive Package, which operates on alternating current. Standard control features include constant speed regulation, infinite speed adjustment, on-off clutch control, and jogging. Special features may be easily added to standard controls to meet the requirements of individual applications.

Dynamatic Transistorized Magnetic Amplifier Control Systems provide a high degree of accuracy and versatility—and are practically maintenance-free.

Send for New Illustrated Bulletin Describing Circuitry, Construction, and Operation.

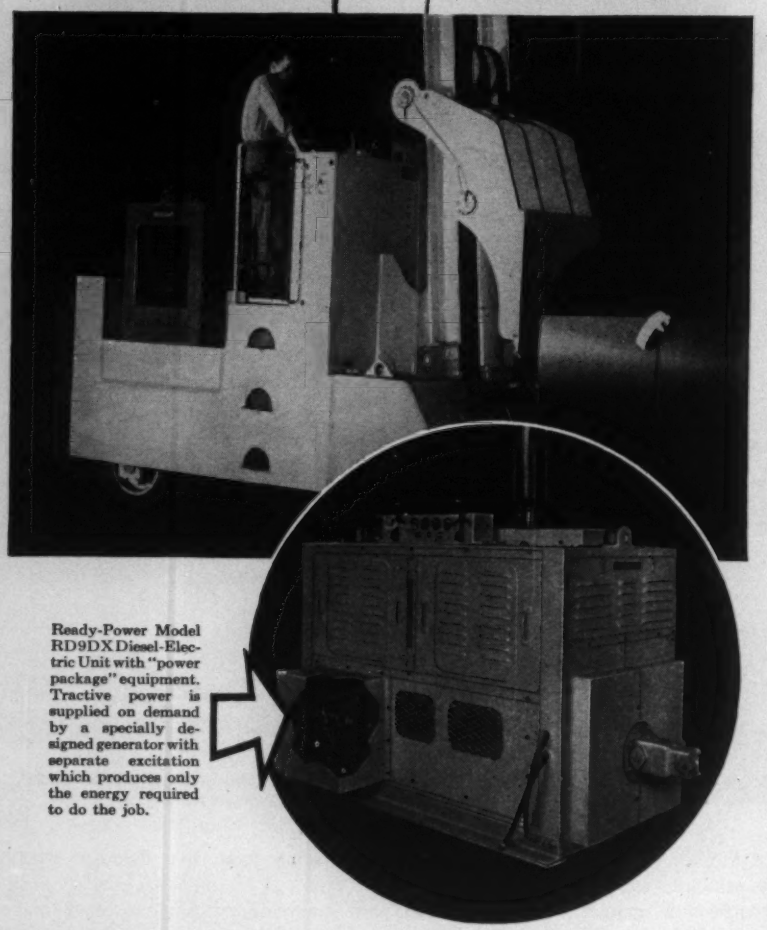
EATON

DYNAMATIC DIVISION
MANUFACTURING COMPANY
3307 FOURTEENTH AVENUE • KENOSHA, WISCONSIN

New Diesel-Electric "Power-Package" Does Both Jobs Economically

1 GENERATES TRUCK MOTIVE POWER

2 DIRECT-DRIVES HYDRAULIC PUMP



Ready-Power Model RD9DX Diesel-Electric Unit with "power package" equipment. Tractive power is supplied on demand by a specially designed generator with separate excitation which produces only the energy required to do the job.

Ready-Power makes diesel-electric power doubly effective with a newly developed "power package" designed specifically for use with its "RD" Series Power Units. This remarkable new concept allows the unit to operate at *constant speed*, no load to full load, yet supplies full range of tractive power on demand and produces continuous hydraulic power without need for intermediate electric motors. The last word in simplicity, this new "power package" eliminates contactor failure, minimizes maintenance, assures maximum operating economy for electric trucks up to 200,000 lb. capacities. Write for complete information.

READY-POWER

The READY-POWER Co., 3824 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks.

dolph Hradeky is manager of the division's manufacturing operations.

ASSOCIATIONS

Fluid Power Society has been formed to bring together all persons interested or engaged in any activity which may further the development and use of fluid power. Barrett Rogers is executive vice president. His address: 5595 N. Hollywood Ave., Milwaukee 17, Wis.

Industrial Diamond Association of America Inc., Pompton Plains, N. J., elected these officers: President, Bernard Jolis, U. S. Industrial Diamond Corp., New York; first vice president, L. H. Metzger, Super-Cut Inc., Chicago; and second vice president, Charles Baumgold, Diamond Tool Research Co. Inc., New York. Mrs. M. J. McGinnis is executive manager, secretary-treasurer.

American Society for Metals, Novelty (Cleveland), Ohio, has established an ASM Technical Council. Chairman of the council for 1960 is George A. Fisher.

NEW ADDRESSES

Arcos Corp., manufacturer of welding rods and electrodes, moved to a new warehouse-sales office building at 6222 Chalet Dr., Bell Gardens, Los Angeles, Calif. C. L. Godward is district manager.

Standard Electronics Div., Reeves Instrument Corp., moved to Route 524, Lakewood Road, Farmingdale, N. J.

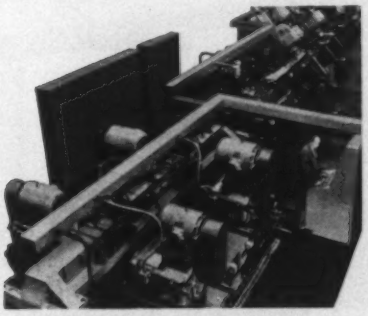
NEW OFFICES

Baker Industrial Trucks Div., Otis Elevator Co., Cleveland, opened a sales and service branch at 5320 S. E. 26th Ave., Portland 2, Oreg. Wilton Smith is branch manager.

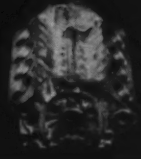
Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill., established a regional sales and service office at 750 Monterey Pass Rd., Monterey Park (Los Angeles),

RELY-ABILITY

81,000,000 motorists are reliably served by parts produced on Sundstrand machine tools



Automobile engine blocks are completely machined at a rate of more than one a minute on Sundstrand transfer machines.



America's 81 million-plus licensed drivers, operating over 68 million motor vehicles, travel an amazing 6.5 billion miles per year.

The remarkably reliable performance of the engines and other major mechanisms in these vehicles is a tribute to the modern machine tools which mass-produce the mechanical parts at fantastic speeds to almost infallible quality and accuracy standards.

At some stage in its manufacture, nearly every motor vehicle built in America today is touched by Sundstrand machine tools. The fully automatic Sundstrand transfer-type machine illustrated completely machines four automobile engine blocks every three minutes—performing drilling, boring, milling, reaming, and tapping operations, and automatically inspecting its own work.

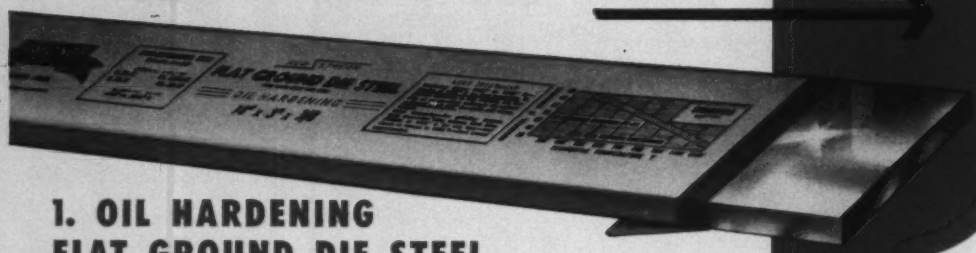
Other products of Sundstrand Rely-Ability include: industrial hydraulic components and systems . . . machine tools and accessories . . . fuel units for oil burners . . . packaging machinery . . . hydrostatic transmissions . . . aircraft and missile systems and components . . . and a wide range of small tools and specialty equipment.

SUNDSTRAND CORPORATION

ROCKFORD, ILLINOIS

SUNDSTRAND

SIMONDS gives you all 3



1. OIL HARDENING FLAT GROUND DIE STEEL

Simonds quality-controlled tool steel . . . precision ground . . . ready-to-use . . . comes in 1001 stock sizes for 1001 uses: punches, dies, machine parts, small tools, etc. Spheroidize-annealed for best machinability. 18" and 36" lengths . . . flats and squares . . . individually packaged. A.I.S.I. or S.A.E. Type No. O1. *Chemical Analysis:* C .85-.95, Mn 1.00-1.25, Si .20-.40, Cr .40-.60, W .40-.60, V .10-.20.

2. AIR HARDENING FLAT GROUND DIE STEEL

This 5% chrome, spheroidize-annealed tool steel has exceptional wear-resistant qualities yet is easy to machine and heat treat. Ground to accurate dimensions . . . suitable for a multiplicity of uses . . . individually packaged in a wide range of stock sizes . . . flats and squares . . . standard 36" lengths (18" lengths also furnished, if desired). A.I.S.I. or S.A.E. Type No. A2. *Chemical Analysis:* C .95-1.05, Cr 5.00-5.50, Si .30-.50, Mn .50-.70, Mo .90-1.10, V .20-.30

3. and the NEW LOW CARBON FLAT GROUND STEEL

Here's a fine-grained, forging quality, silicon-killed steel that offers important savings on jigs, fixtures, patterns, stripper plates, punch pads, die plates, die-blocking shims . . . and parts that don't require heat treatment, or in some cases just case-hardening. This new line of low-cost steel rounds out the Simonds line of Flat Ground Steel, has equally fine finish, with excellent welding quality and machinability. Furnished in a wide range of flats from 1/16" to 1 1/2" thick and 1/2" to 16" wide, and in squares from 3/8" to 2 1/8". All sizes come in standard, ready-to-use 24" lengths, individually packaged. *Typical Chemical Analysis:* C .18, Mn .50, Si .20, S .04, P .04

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PROMPT DELIVERY OF
ALL 3 TYPES
FROM YOUR SIMONDS DISTRIBUTOR

For Fast Service from Complete Stocks
Call your
SIMONDS Industrial Supply DISTRIBUTOR

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FITCHBURG MASS

Factory Branches in Boston, Chicago, Shreveport, La., San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.
Heller Tool Co., Newcomerstown, Ohio
Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

Calif. W. F. Paetz is regional sales manager.

Ziegler Steel Service Corp., Los Angeles, opened an office in Fresno, Calif. P. H. Philips is in charge.

NEW PLANTS

Vanadium-Alloys Steel Co., Latrobe, Pa., opened a steel service center near the Valley Forge interchange of the Pennsylvania Turnpike. It's in the Philadelphia district under the managership of J. Russell McCarron. The firm will maintain its main Philadelphia sales office at Wynnewood, Pa.

MiLat Machine & Tool Co. opened a 15,000 sq ft plant at Plainview, N. Y. The firm has grown from basic tooling and diemaking to become a specialist in the production and assembly of precision metal stampings for electronics, business machine, and ordnance industries.

Midway Trailer Corp., Grapevine, Tex., opened a plant in Lamar, Colo. Dale Whitbeck is assistant general manager in charge of the new plant.

Ohio Rubber Co., a division of Eagle-Picher Co., Cincinnati, is constructing a $3 million plant covering 190,000 sq ft at Ft. Smith, Ark. The plant will produce mechanical rubber goods.

M. W. Kellogg Co., New York, is building a $4 million plant at Williamsport, Pa. The engineering and construction firm will locate its Power Piping Div. in the new plant.

Master Power Corp., a subsidiary of Black & Decker Mfg. Co., Towson, Md., will construct a 50,400 sq ft factory and office building on Cochran Road, Solon, Ohio. Cost: About $700,000. The plant will provide for expansion of air tool manufacturing and engineering facilities.

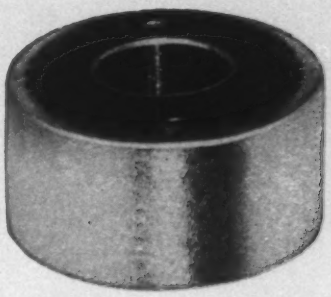
U. S. Concrete Pipe Co., a subsidiary of Pittsburgh Coke & Chemical Co., Pittsburgh, is constructing a $2.5 million vitrified clay pipe

(*Please turn to Page* 88)

OSBORN®

BEFORE BRUSHING
Insulation residue on this small, copper electric motor commutator was a knotty, costly cleaning problem. Rate: 800 per hour.

AFTER BRUSHING
Surface quality-finished . . . insulating material and feather burrs gone . . . ready for trouble-free assembly. Rate: 3500 per hour.



Production soars from 800 to 3500 pieces per hour

...with OSBORN power brushing

PRODUCING at the rate of 3500 pieces per hour (over 330% greater than former off-hand method) these Osborn TY® Master® Wheels remove troublesome phenolic-type residue from electric motor commutators at Dayton Precision Manufacturing Co.

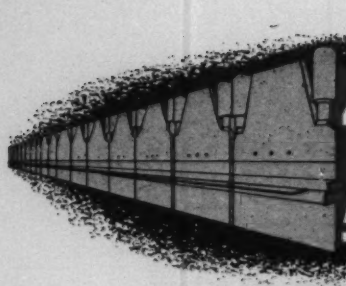
Slow, off-hand methods were being used to remove insulation residue from these commutators. Production was costly . . . parts lacked uniformity.

A specialized, but simple machine now handles the operation. Parts are automatically fed along a guide tube and through a pair of Osborn TY® Master® Wheel brushes. In this centerless type finishing setup—the job is done effectively in pre-set time cycles. Results: production and quality up—rejects eliminated . . . time and costs down.

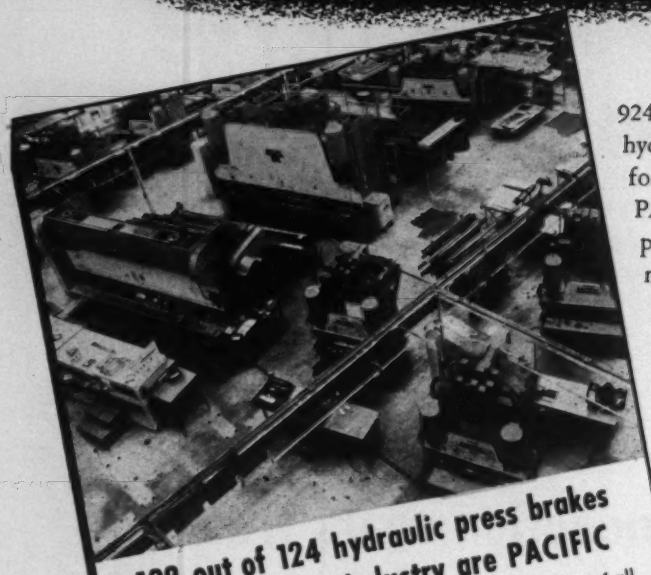
Cleaning and finishing problems in your plant can be solved with similar production savings. An Osborn Brushing Analysis—made in your plant now at no cost or obligation—is the first step. Write us for full details. *The Osborn Manufacturing Company, Dept. S-19, Cleveland 14, Ohio.*

Osborn Brushes

METAL FINISHING MACHINES . . . AND FINISHING METHODS
POWER, PAINT AND MAINTENANCE BRUSHES • FOUNDRY PRODUCTION MACHINERY



4,769 years to arrive ACCURATE HYDRAULIC

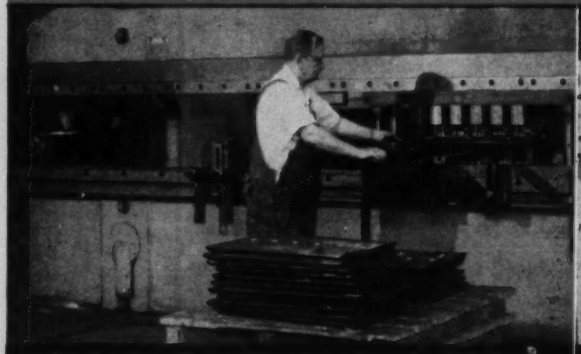


122 out of 124 hydraulic press brakes in U.S. aircraft industry are PACIFIC

Aircraft manufacturers work to the closest tolerances of all industries in metal forming. Douglas Aircraft Company, Tulsa, Oklahoma, with 8 Pacific Brakes (above) is typical of the airframe manufacturers who have selected Pacific for its precise accuracy.

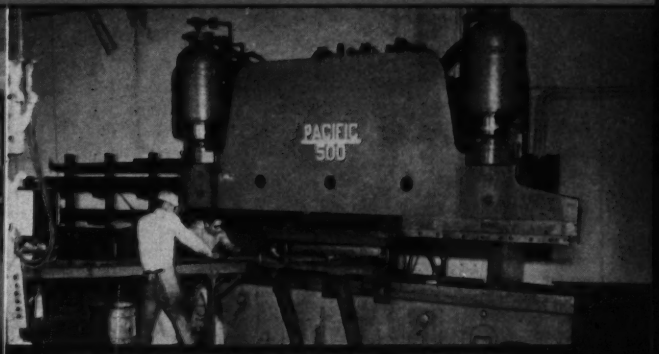
924 PACIFIC Brakes, representing over 95% of all hydraulic press brakes in use today, have operated for an aggregate of 4,769 years to test and confirm PACIFIC designs that have established hydraulic press brakes as far more profitable to operate than mechanical brakes. However, only PACIFIC has precise accuracy, versatility, high speed and dependability that comes from years of experience in manufacturing, developing and improving this unique machine. It is the only hydraulic press brake in daily operation that is actually air bending, straightening, deep drawing, blanking, and doing heavy punching. Accuracy within thousandths of an inch (greater than with any mechanical or other hydraulic brake) repeats itself on every stroke. Ram remains level regardless of location of work on the bed. PACIFIC sizes range from 60 tons to 1500 tons.

PACIFIC HYDRAULIC



Only hydraulic brake built for HEAVY PUNCHING

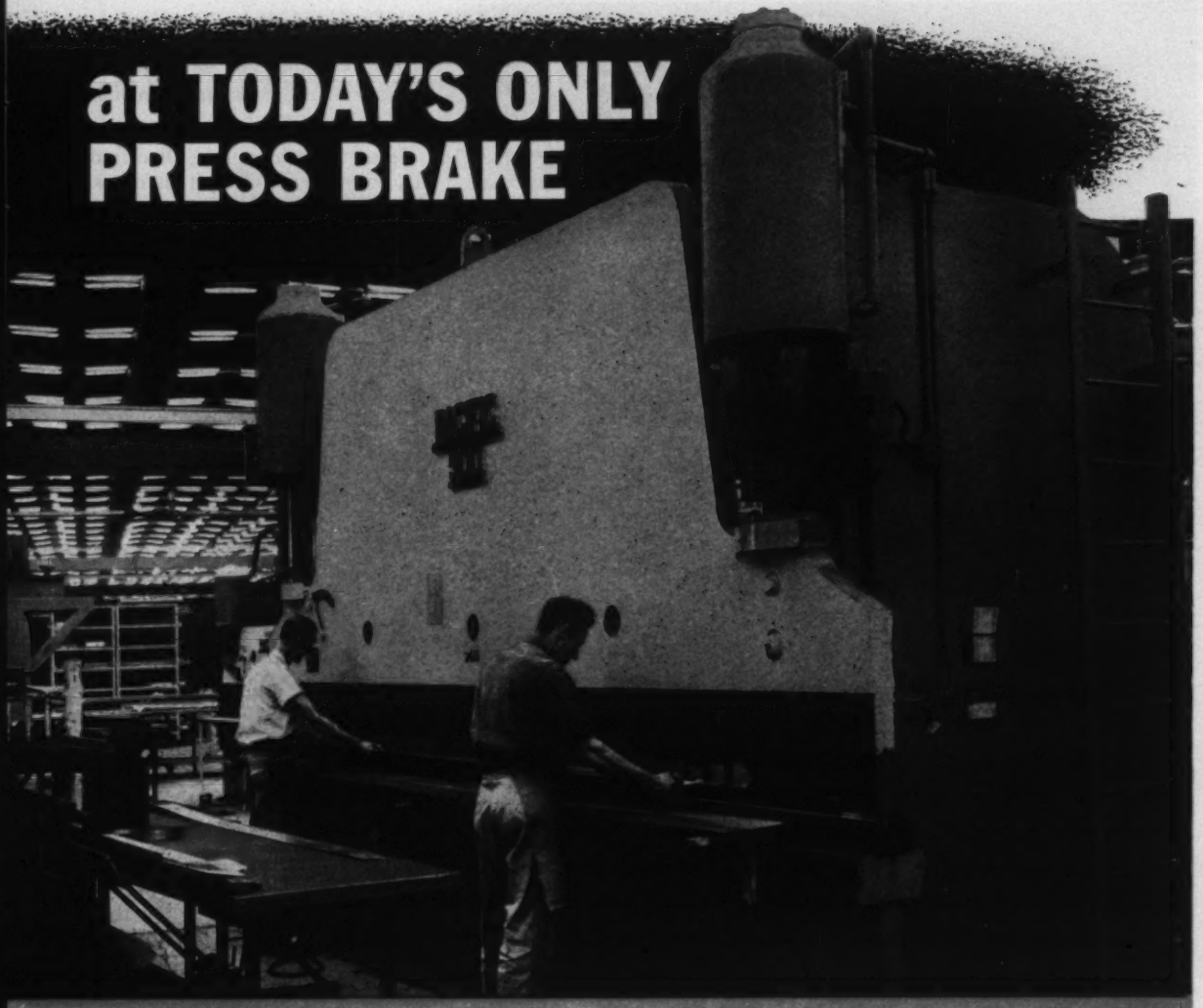
Pacific is uniquely designed to absorb heavy shock from punching in the hydraulic system rather than in the frame of the brake. Cushioned against shock, punch and dies stand up from 3 to 8 times longer than with mechanical brakes. Photo (above) shows 1" alloy steel plate being punched at earthmoving equipment plant.



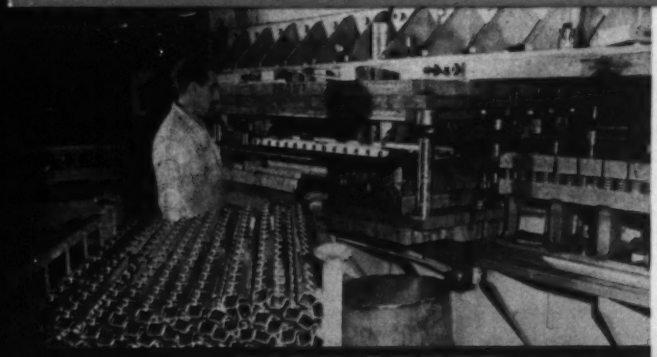
MAINTENANCE-FREE for years

Dependable, simplified electrical and hydraulic controls can easily be kept working continuously by any plant maintenance crew. There are no complicated electronic devices. In photo (above) at agricultural equipment plant, the 500 ton Pacific Hydraulic Brake shearing ¾" alloy steel plate with Pacific Shearing Attachment has operated continuously for the first 4 years at a cost of $5.22 in replacement parts.

at TODAY'S ONLY PRESS BRAKE



PRESS BRAKE



HIGH SPEED operation

Pacific adjustable stroke length can be shortened for rapid stroking. Automatic, self-leveling ram permits use of progressive dies across entire bed of press. The automatically-fed Pacific at automotive parts plant, which can cycle up to seventy 1½" strokes per minute, is forming 3780 operations per hour in the above photo. In virtually any operation, Pacific's high cycling speed equals or exceeds materials handling capacity.

Write for brochure

PACIFIC INDUSTRIAL MANUFACTURING COMPANY

848 49th AVE., OAKLAND, CALIF.

PLANTS:

OAKLAND, CALIF. and MT. CARMEL, ILL.

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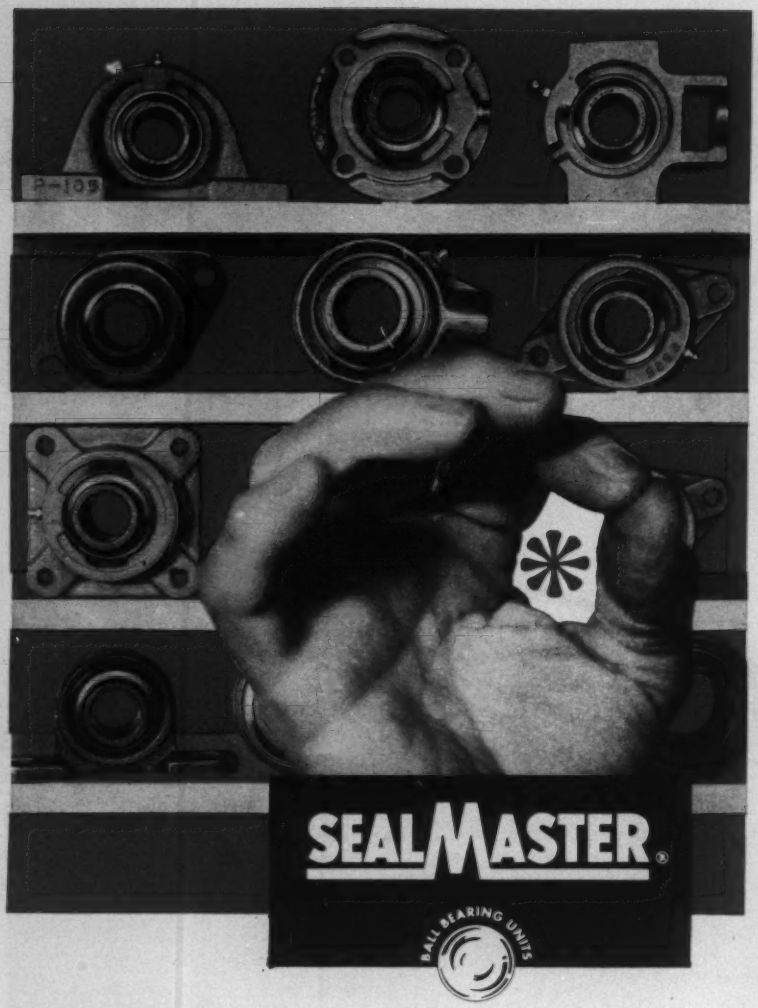


You'll find the Quality line at the SEALMASTER sign!

Backed by a quality reputation attained by SEALMASTER Bearings over the years and a complete line of quality bearing units in a wide range of sizes and styles of mountings, your Sealmaster Distributor is best equipped to give you top service on all your bearing requirements. The SEALMASTER line of cast iron units, malleable iron units, rubber lined units and cartridge units, incorporate engineering features exclusive with SEALMASTER.

Service is what you want and service is what your SEALMASTER Distributor is prepared to give—a good man to know and depend on.

Write for Catalog 454

SEALMASTER BEARINGS
A DIVISION OF STEPHENS-ADAMSON MFG. CO.
99 RIDGEWAY AVENUE • AURORA, ILLINOIS
PLANTS IN: LOS ANGELES, CALIF. • CLARKSDALE, MISS. • BELLEVILLE, ONTARIO

(*Concluded from Page 85*)

plant at Ocala, Fla. Facilities will include a tunnel kiln with preheaters, extrusion presses, and joint fabricating equipment.

Ipsen Industries Inc., Rockford, Ill., opened a 40,000 sq ft plant near Cherry Valley, Ill., for the manufacture of heat treating equipment.

Krusen Wire & Steel Co. opened a 25,000 sq ft warehouse building at 7271 Paramount Blvd., Pico Rivera (Los Angeles), Calif. Cost: More than $200,000.

CONSOLIDATIONS

Ferro Corp., Cleveland, acquired **Vitro Mfg. Co.**, Pittsburgh, a division of Vitro Corp. of America. Vitro Mfg. Co. makes a line of glass and overglass colors, glaze stains, and porcelain enamel oxides.

Mather Spring Co., Toledo, Ohio, acquired the **Lus-Trus Corp.**, Ypsilanti, Mich., specialist in the extrusion of thermoplastics.

Vulcan-Associated Container Co. Inc., Birmingham, has been organized through merger of these companies: **Vulcan Steel Container Co.**, Birmingham; **Vulcan Containers Inc.**, Bellwood, Ill.; **Atlantic-Vulcan Steel Containers Inc.**, Boston; **Southwestern Steel Containers Co.**, Dallas; **Vulcan Containers Pacific Inc.**, San Leandro, Calif.; **Vulcan Containers Ltd.**, Toronto, Ont.; and **Containers Ltd.**, Vancouver, B. C. Officers are: President, G. D. Zuck; chairman, V. I. McCarthy Sr.; executive vice president, Fred Kosta; treasurer, V. I. McCarthy Jr.; secretary, P. H. Oberholtzer; assistant secretary, W. L. Carter; and assistant treasurer, George Zies.

Lockheed Aircraft Corp., Burbank, Calif., is acquiring **Colby Steel & Mfg. Inc.**, Seattle, and **Colby Crane & Mfg. Ltd.**, Vancouver, B. C. The Colby firms produce cranes, elevators, hoists, and other material handling equipment.

Sweetland Co., San Francisco, acquired **Hydraulic Equipment Co.**, Los Angeles.

Manhour costs cut 51% by Budgit® Electric Hoist

Push Button Budgit Electric Hoist. Portable. For regular hoisting service where lifting speed and positive braking action are essential to keep production on the move. A 1-ton load can be lifted at 17 F.P.M. Two fully enclosed automatic brakes assure safe load control as well as accurate spotting action. Compartmented components reduce maintenance needs to the utmost in simplicity. Hook suspension. 110-220-440-550 volts AC. Only 24 volts at the push buttons on the higher voltage models for extra safety. Capacities: ⅛ to 2 tons.

Pull Cord Budgit Electric Hoist. Portable. Ideal for intermittent service. Has efficient gearing and two brakes. Provides fast lifting and one-hand operation. Available for AC, DC, and 12-volt battery operation, the latter models for truck or other use where regular electric power is unavailable. Hook suspension. Capacities: ⅛ to 2 tons.

60 A-2

At Kent Products, Inc., Grand Haven, Michigan, high speed presses turn out small automotive stampings in big quantities, so scrap metal removal is a constant task.

One man using a 1-ton Push Button Budgit Electric Hoist on a push-type crane does the job easily and safely. He first attaches two grabs to a scrap-filled drum. Using one hand to "thumb" the push button, the operator hoists the load. His other hand guides the drum into the trailer truck. Spotting is accurate, even in piling the drums two-high.

The old method required a fork truck and driver, plus two other men to handle the drums in the trailer. Frank W. Behm, Plant Manager, reports that the new way paid for hoist, crane assembly and accessories in a few months.

Compare the new P:B Budgit Hoist with any other electric hoist in its class. It's a portable hoist you can hang up, plug in, and use immediately with top efficiency, safety, convenience and economy. Write for Bulletin 15010-15C or ask your nearby Shaw-Box Distributor for a demonstration.

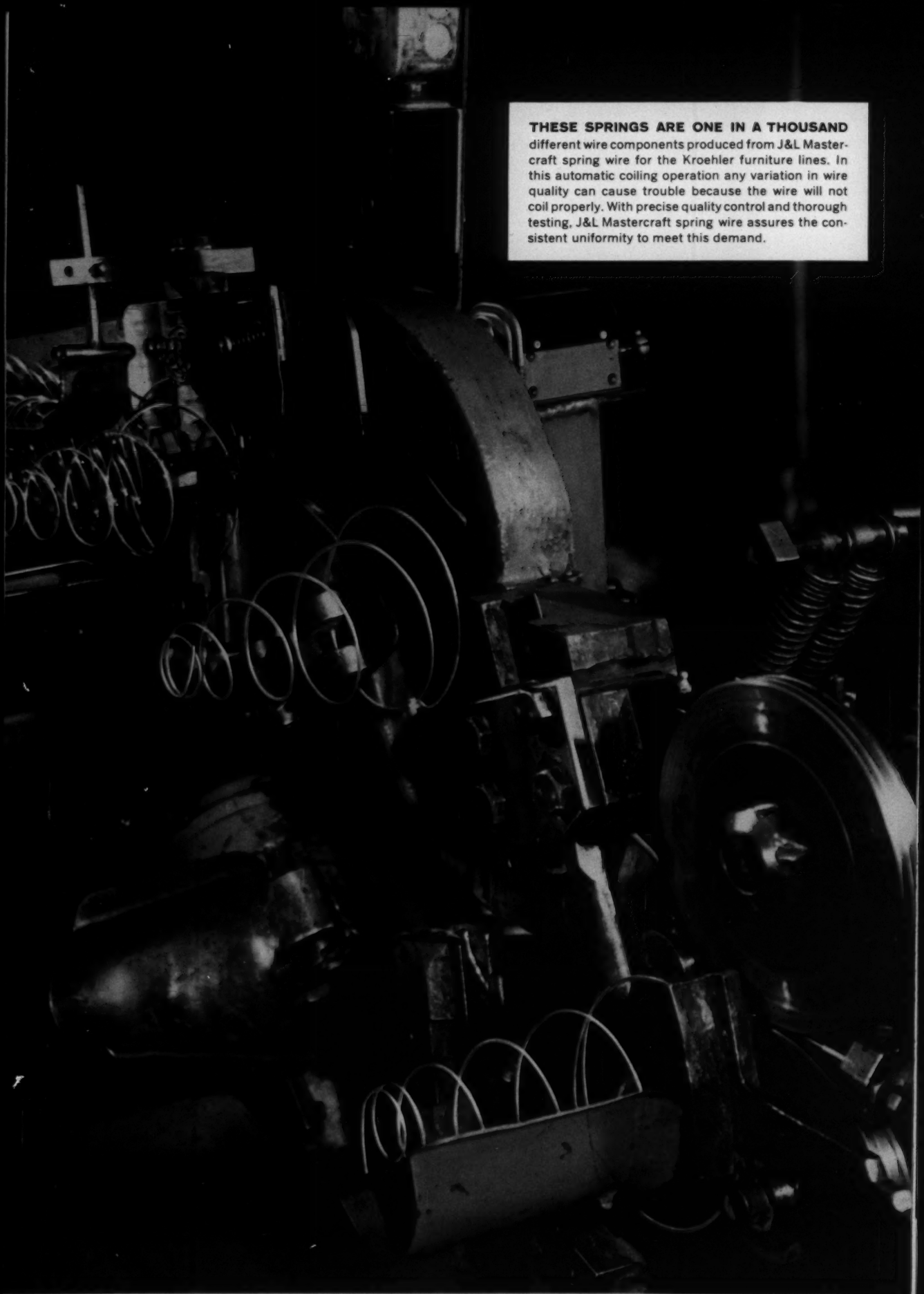
MANNING MAXWELL & MOORE, INC. TRADE MARK

BUDGIT ELECTRIC HOISTS

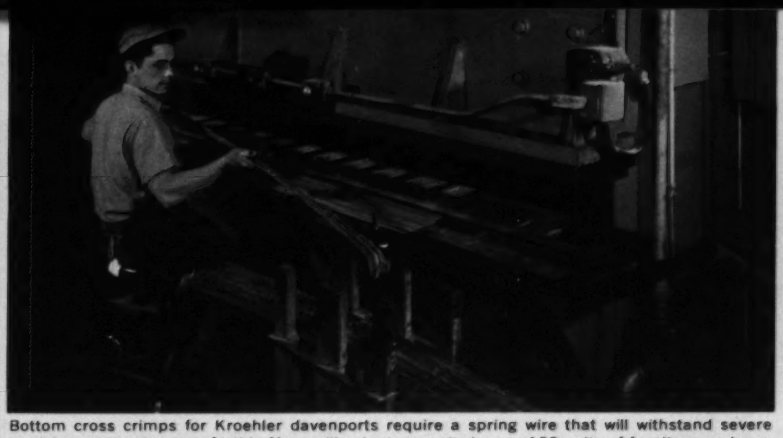
A product of

MANNING, MAXWELL & MOORE, INC.

Shaw-Box Crane & Hoist Division • Muskegon, Michigan
In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

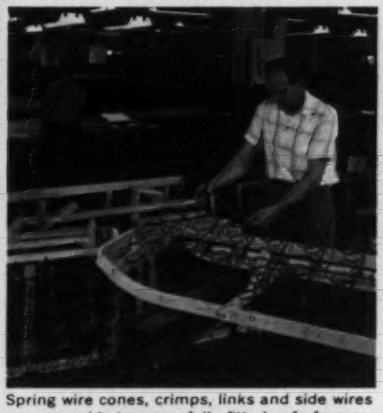


THESE SPRINGS ARE ONE IN A THOUSAND different wire components produced from J&L Mastercraft spring wire for the Kroehler furniture lines. In this automatic coiling operation any variation in wire quality can cause trouble because the wire will not coil properly. With precise quality control and thorough testing, J&L Mastercraft spring wire assures the consistent uniformity to meet this demand.

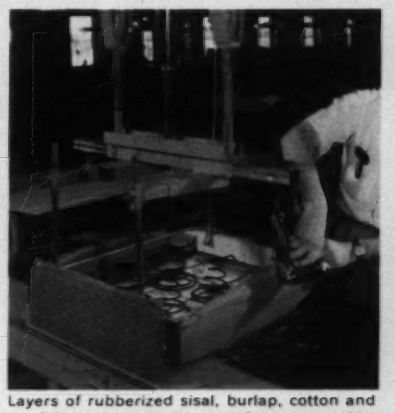


Bottom cross crimps for Kroehler davenports require a spring wire that will withstand severe punishment in crimping. At this Naperville plant, capacity is over 100 units of furniture an hour.

Custom-made Kroehler cushions require many components made from J&L wire.

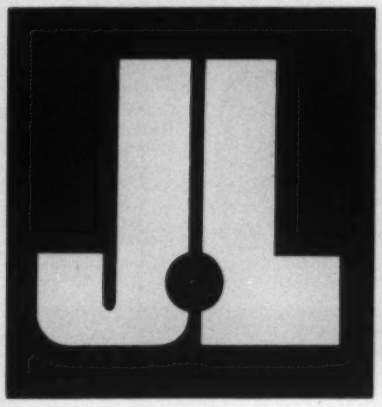


Spring wire cones, crimps, links and side wires are assembled on carefully fitted sofa frames.



Layers of rubberized sisal, burlap, cotton and top fabric are applied to seat frame assembly.

A skilled operator applies finishing touches to this Kroehler chair.



Over 400 separate items of furniture are produced for the Kroehler and Valentine Seaver lines by 17 plants in the U.S. and Canada. Helping to uphold the Kroehler reputation for fine furniture are the many spring wire components produced from J&L Mastercraft wire.

Report from the world's largest furniture maker...

"We reduce rejects, machine downtime and waste with J&L Mastercraft spring wire"

. . . Kroehler Manufacturing Company

"We've never had to remove a J&L Mastercraft coil from a machine . . . never had to call in J&L to solve a wire deficiency problem.

"Our machine operators are sold on J&L wire. The uniform physical properties of Mastercraft spring wire result in more uniform production runs, with fewer machine adjustments. Also, J&L's special spring wire finish does not foul our machines. That means fewer shutdowns for equipment cleanup."

Similar facts are reported by many other automatic spring-making operators. Reduced rejects, increased production are achieved because every coil of Mastercraft, hard-drawn MB or Electromatic oil-tempered MB spring wire is quality controlled, completely tested.

Try this superior J&L product. It's tops in quality, competitive in price. Contact your nearest J&L district office, or write to Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

How Fafnir Ball Bearings help spray dryer manufacturer get

Reduced bearing costs with no loss in efficiency

In spray dryers produced by a New Jersey manufacturer for the chemical, pharmaceutical, food, and other process industries, a solution or slurry is fed through a hollow, vertical shaft and centrifuged outward into a drying chamber.

The spray is forced into a wheeling vortex by air heated to 200°F to 1000°F. The hot, turbulent air currents evaporate the water and instantaneously transform the solids into powder. The dried products and air pass from the chamber through a duct to a product collector, after which the air is exhausted to the atmosphere.

The driving source of the spray dryer is a high frequency induction motor. The motor armature is located between super-precision ball bearings. Drip feed lubrication is employed at both bearing locations. At the lower location, an aspirator prevents lubricant from working out into the machine's drying chamber.

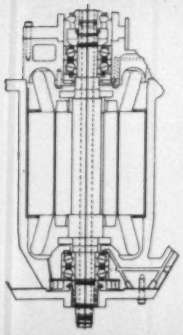
During recent redesigning, the manufacturer called on Fafnir to review proposed bearing specifications. The original design incorporated duplex pairs of super-precision bearings mounted back to back.

After studying the loading and service conditions involved, Fafnir engineers advised the manufacturer that single, spring-loaded, super-precision bearings, rather than duplex pairs, would provide the necessary capacity, support, and service life. A similar recommendation was made for a new spray dryer unit then under consideration.

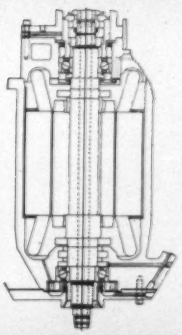
Recommendations of the Fafnir engineers were carried out resulting not only in full operating efficiency, but also effecting substantial savings in bearing costs.

This case history from Fafnir's engineering service files is typical of thousands of ball bearing problems Fafnir has helped solve for manufacturers in every field of industry. For information about the ball bearings described here, or for help with problems you may have, contact your Fafnir branch office nearest you, or write The Fafnir Bearing Company, New Britain, Conn.

Fafnir Super-Precision Ball Bearing — Preloaded, angular-contact bearings, equipped with composition retainers, are widely used in precision-built mechanisms.



BEFORE
Two duplex pairs of super-precision ball bearings were used to support the high speed shaft of this spray dryer. Redesign specifications called for use of wider type duplex pairs. The change-over was believed necessary for satisfactory shaft support.



AFTER
Fafnir engineers, after a study of loadings and service conditions, advised that a single, super-precision ball bearing at each location would provide ample rigidity. The change resulted in substantial savings at no sacrifice in operating efficiency.

FAFNIR
BALL BEARINGS

Technical Outlook

THERMIONIC PEEK—Large scale electrical power from machinery with no moving parts is the goal of several large metalworking firms. Dr. John Reitz, Case Institute of Technology, Cleveland, thinks thermionic converters (prolific sources of electrons) coupled to nuclear reactors may be one way to success.

HUGE POWER SUPPLY—Allis-Chalmers Mfg. Co., Milwaukee, is building a 420 ton power supply to deliver 11,000 amperes at 12,500 volts for a major atom smasher (12.5 Bev) at Argonne National Laboratory, Lemont, Ill. A feature of the power supply is a 68 ton, 13 ft steel flywheel.

NO-DRAFT FORGING— Precision titanium yokes for aircraft are being forged with dimensional tolerances that compare favorably with all-over machined pieces, claims Steel Improvement & Forge Co., Cleveland. The buyer, a major aircraft firm, says the savings are significant.

DIAMOND RECLAMATION— A new technique developed by the Army's Springfield (Mass.) Armory is said to recover between 95 and 99 per cent of diamond dust in machine wiping cloths. The method also saves the cloths for re-use instead of burning or decomposing them with acids or alkalies, and is much safer for operating personnel.

VANADIUM MAKES PROGRESS— A long step toward commercial availability of vanadium mill products has been taken with delivery of about 300 lb of bars, sheets, and plates to the government. Union Carbide Metals Co., a division of Union Carbide Corp., New York, says it has made 0.005 in. wire and plates.

SMALL PARTICLE SORTING— A heat sensitive thermoplastic coating on a flexible belt simplifies removal of impurities from pea size material at International Salt Co., Detroit. A vibrating feeder puts a thin layer of particles on a coated belt which moves under an infrared heat lamp. Darker particles absorb more heat, melt the plastic and stick; lighter particles drop off the end. A scraper removes the stuck particles. The idea might be adapted to sorting multicolored parts.

MILL SPEED ANNEALING—Tubemakers soon may be able to anneal small, cold formed tubing at 250 fpm, says Lindberg Engineering Co., Chicago. It is working on an induction unit to handle tubing at mill speeds.

PRECISION GAGING—Environment is just as important as gage quality when measuring to 30 millionths of an inch, states Lou Heinhold, manager, Automatic Control Engineering Dept., Federal Products Corp., Providence, R. I. Next week in STEEL, he tells what it takes to gage millionths and points out that it's simpler to measure relationships (clearance, for example) than part dimensions at such tolerance levels.

TRACK SHOES— Forged, high strength aluminum takes the beating shoes get in tank tracks. Field trials conducted at the Army's Aberdeen Proving Grounds, Aberdeen, Md., showed that aluminum was comparable to other materials.

RELIABILITY PRESSURE— Increasing emphasis on reliability is bringing pressure to bear on raw material producers. One result: Inland Steel Co., Chicago, is shopping for a new, high speed, ultrasonic scanning unit to catch flaws in strip at mill speeds. It must match or exceed a unit now in use at an auto plant. Experts predict the trend will continue.

NEW CASTING TECHNIQUE— Foamed polystyrene makes an excellent one-shot pattern for castings, finds Alfred M. Duca, research associate, Massachusetts Institute of Technology, Cambridge, Mass. Shape is carved directly in the plastic which is then used like a lost-wax pattern. Molten metal vaporizes the pattern.

Do You Really Know How Hot It Is?

Temperature measurement isn't as easy as many people believe, and it becomes more difficult (and expensive) when precision is required. This article will help you evaluate the methods you are using

WE'RE ENTERING a technological era in which temperature control will become increasingly critical. To squeeze the ultimate in properties from available materials, you'll have to be familiar with temperature scales that once were confined to the laboratory.

Not only that: Space age developments will call for the use and measurement of extremely high and low temperatures.

Today's instruments are often capable of closer control than has been required, but to get the most from them (and to keep up with the improvements coming along), you'll need an understanding of temperature measurement principles and the problems inherent in them.

Problems like these will become routine: When two measurements of the same temperature disagree, which one is likely to be right? How do you check? Once you've made sure of the calibrations of the instrument you use, have you any assurance it won't be affected by the operation? And how much does the temperature probe change the effect being measured?

Face the fact too that higher precision is always expensive — in terms of care and time as well as money.

Here are a number of the fundamentals that will help you get the job done.

• Temperature scales are arbitrary. As in the case of weight or distance, a number of useful scales have been developed.

It's easy to say that temperature is the relative amount of heat contained in an object. But it's tough to put the value into numbers. It's far easier to tell a temperature difference than the absolute value.

To set up temperature scales, scientists assign values to certain "fixed points," such as the freezing and boiling points of water. The space or range between them is divided on some regular basis. The result: A temperature scale, such as Fahrenheit, centigrade, or Reaumur.

Dr. Edward Teller of the University of California tells how Fahrenheit, a German, set up his system: "He waited in Danzig until it got as cold as it would get, stuck his thermometer out the window—and that was zero. Then he put it under his arm, and he seemed to have a slightly elevated temperature, and that became 100."

Using the freezing and boiling points of water, 32 and 212 degrees on the Fahrenheit scale, the intervening space is divided into 180 parts or degrees.

The centigrade (or Celsius) scale divides the same space into 100 parts. Hence the name centigrade, meaning 100 divisions. It is used in most scientific work, as the common scale in Europe, and is gaining in metalworking measurements.

Reaumur, not widely used today, divides the same range into 80 degrees.

• Later study showed a theoretical lower limit to temperature.

Absolute zero, which is based on thermodynamic calculations, is the temperature at which the molecules of a perfect gas would have no energy of motion. Since energy of motion corresponds to heat, no motion means no temperature.

If we measure temperature from absolute zero, using centigrade degrees, the scale is called the Kelvin (K) scale; while if we use the Fahrenheit divisions, the system is called Rankine. But the scales are independent of the method used in measurement, so a measuring device can be calibrated for any one or a combination of the standard scales.

• Most common of the temperature measuring devices is the liquid in glass thermometer, using mercury, alcohol, or other liquid contained in a bulb attached to a capillary stem.

Heating causes the liquid to expand, and the amount of expansion is the measure of temperature. Beckmann thermometers, using mercury, can be read to about 0.001° C—but have a range of 5 degrees. For precise work, you must take into account: The glass will expand (although at a slower rate than the liquid); it takes time for the glass to shrink after it has been heated; and the depth of immersion of the stem must be known.

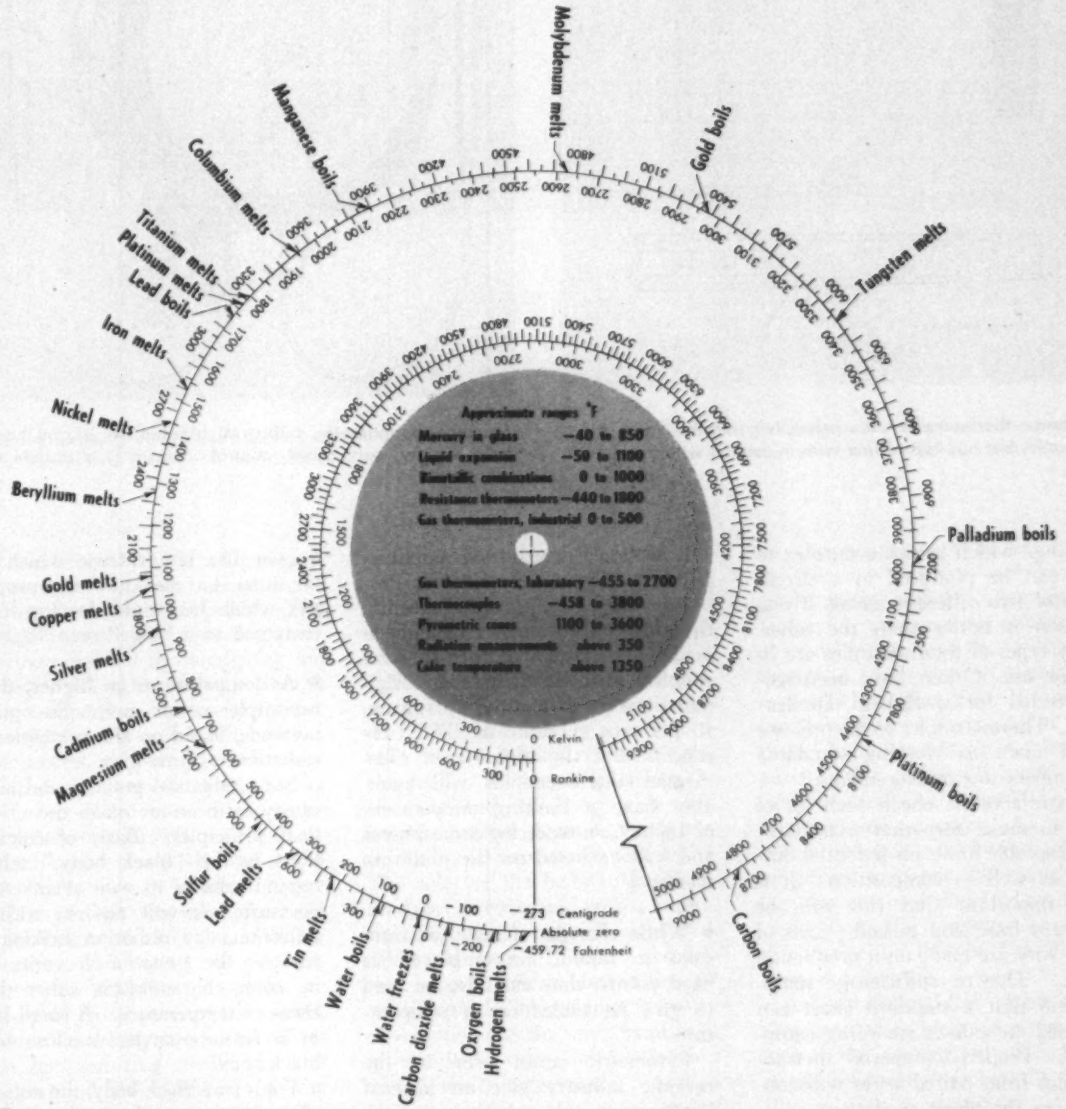
Industrial versions of the liquid bulb thermometer may use the increase in volume to drive a pointer across a scale or a pen over a chart. Gas filled thermometers with a similar principle are also used.

Another common type of bulb instrument depends upon the change in vapor pressure of a liquid with temperature. It is independent of the volume of the system, has a nonlinear scale, and is more limited in temperature range than expansion types.

Solids will also expand with increasing temperature, and the property is employed for temperature measurement. Most common is the bimetallic strip, used in household thermostats and widely employed throughout industry. Strips of different metals, such as steel and brass, are joined. They have different rates of expansion, so with an increase in temperature one side of the strip expands more than the

How Temperature Scales Compare

A line drawn from the center of the circle to the outside shows equivalent temperatures

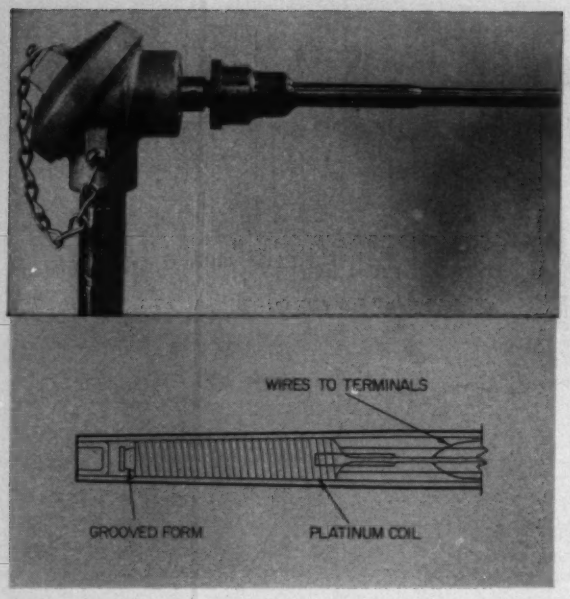


other, causing the strip to bend. Bending may indicate temperature by moving a pointer across a scale, or may be used without indicating to control a temperature by making or breaking a contact.

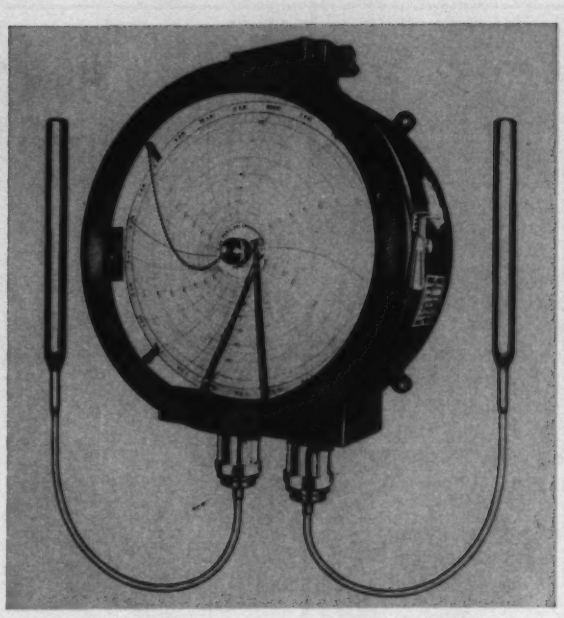
• Electrical measuring devices are in common use over a wide range of temperatures. They're based on a number of different principles.

Resistance changes with temperature and can be measured accurately. So resistance thermometers can be made. Lead wires which are not greatly affected by temperature are used to connect the sensitive element to the measuring device; thus leads can be as long as required.

An electrical method based on an 1821 discovery brought about thermocouples, even more widely used. Seebeck, a German, learned



Resistance thermometer uses protective sheath, like a thermocouple, but has coil of fine wire in contact with the sheath



Mercury thermometer, industrial big brother of the household variety, can record, control. Shown is a double unit

a voltage which causes a current to flow can be produced in a circuit made of two different metals if one junction is hotter than the other. Many types of thermocouples are in routine use. Others have been recommended for specialized applications. Thermocouples frequently are relied upon as working standards in temperature measurements.

Manufacturers check each lot of wire to make sure that it is within acceptable limits for potential output, as well as composition. It is also important that the wire be uniform from end to end. Lots of such wire are made on a production basis. They're sufficiently reproducible that a standard chart can be used on today's recording equipment. Properly prepared thermocouples from paired wires will conform to the chart gradations.

The platinum-platinum, 10 per cent rhodium thermocouple is used as a standard thermometer for a portion of the international temperature scale and is often employed in industry — particularly for high temperatures where less costly couples will fail rapidly.

Advantages of thermocouples include small size, ruggedness, simplicity, ease of electrical insulation, sensitivity, and relative freedom from errors requiring correction.

R. C. Lever, consulting metallurgist for GE's Aircraft Nuclear Propulsion Dept., told an SAE meeting that few improvements have been made in high temperature thermocouples since Le Chatelier originated the use of platinum-platinum, 10 per cent rhodium in 1886. He expects that the ultimate in commercial thermocouples will probably have a limiting temperature of 1800° C in oxidizing atmospheres and will be based on the platinum metals.

• While changes of state, as from solid to liquid, are employed as fixed points, they can also be used to give an indication of temperature.

Pyrometric cones used in the ceramic industry give an idea of temperature although they may be affected by heating cycle and the duration of time and temperature. Change of state is also the principle of crayons, paints, and pellets used for determining when an object has reached a given temperature. In working with iron and steel, the change in magnetic properties may be used as a temperature indication, as well as the change in surface color on heating a polished piece of steel. The old time tool hardener might not have known the temperature which he obtained, but he knew the properties which he would develop if he tempered to a "blue" or a "straw."

• As temperatures go higher, thermocouple metals melt. So optical methods, based on the principles of radiation, are used.

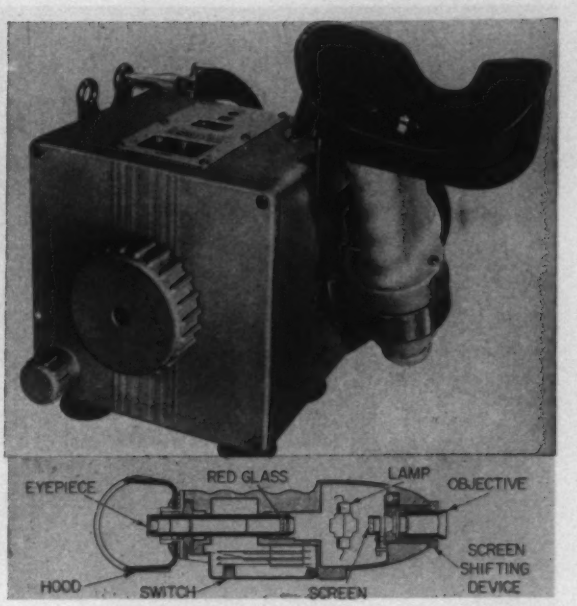
Both industrial practice and laboratory calibrations make use of optical principles. Basis of calculations is the "black body," which has no color of its own at any temperature. It will absorb, without reflection, any radiation striking its surface; the radiation it emits has no color characteristics other than those of temperature. A small hole in a furnace cavity is close to a black body.

For a true black body, the amount of radiation and its distribution over the spectrum can be calculated from basic laws of physics. Measurement of the predicted characteristics will permit determination of temperature.

• A theoretically perfect radiating body, like a theoretically perfect spouse, is not often found in nature. So allowances must be made.

In the case of the radiating body, this correction factor is called the emissivity. The theoretically per-

Radiation sensing device uses special lens to focus radiation on a thermopile (group of thermocouples in series)



Optical comparison pyrometer matches object being measured and variable, temperature calibrated, tungsten filament

fect radiating body is assigned an emissivity of 1; other radiators are characterized by lower values. The actual emission of a radiating body may be predicted by calculating the emission of a black body at the same temperature and multiplying by the material's emissivity factor. The process may be reversed to determine the true temperature by measuring emission, when the emissivity factor is known.

With some materials, the emissivity will vary at different wave lengths so that the correction will be dependent on the color at which measurement is made. In some respects, the situation is similar to that faced by the user of a compass. In most locations, there is a difference between true north and the magnetic north indicated by the compass. The deviation from true north will vary with location. Measurement of magnetic north alone may be quite serviceable under certain conditions, but a correction must be made if true north is required. In the same way, measurement of total emission or of emission at a particular wave length may be quite serviceable for comparative purposes, but the correction must be applied if the true temperature is to be known.

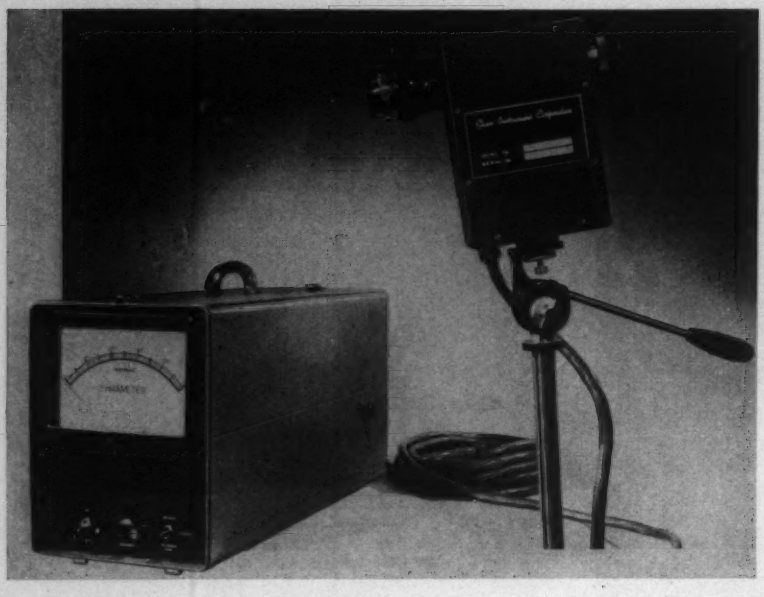
The method of measurement in optical ranges must be taken into consideration, and there are many. It is often convenient to convert the signal into electricity to operate recording or controlling devices.

The total radiation may be measured, usually by converting it into heat or by focusing it on a photocell. Visible radiation may be determined. Apparent color can be observed and will vary with temperature. The radiation in a particular wave band can be employed. The color of the body to be measured can be compared with a known standard, such as the filament of a calibrated lamp. (Current through the lamp filament determines its temperature.) The relative intensity of radiation in two wave bands can be compared since the relationship varies with temperature. And a trained observer can come pretty close just by visual observation.

• As the temperature of a heated body increases, it goes through a series of color changes.

Turn on an electric range or hotplate, and you can watch such color changes. Below about 1000° F, little or no color is apparent, yet the heating element is radiating in the infrared, as a hand held near the unit will disclose. Later, a barely perceptible red glow appears. As the temperature increases, the red becomes brighter and progressively more orange. Further increase in temperature pushes the observed colors into the yellow, although a stove element would not normally get that hot. In metallurgical furnaces, operating at relatively high temperatures, the apparent color shifts still more away from the red and toward the blue in the visible spectrum. An experienced operator can frequently tell temperatures rather closely by judging the color of the furnace. He is automatically applying an emission correction that he has learned from experience.

An interesting, but rather complex, method of measuring temperature is the comparison of emission at two different wave lengths (visually or with a photocell). Determination of emission in the longer (red) wave length could be made, and it would be compared with emission in the shorter (blue) areas. Measurement of the emission in the red areas functions as a sort of internal standard. Comparison of the two—the relationship is specific for any temperature—determines the value. Any factor which does not disturb the color values, although it may reduce total emission, has little effect on the temperature read-



Two color pyrometer compares emission in red and blue bands to determine temperature, can function with recorder

ing. Examples: Smoke, fumes, dirt on the viewing lens, partial obscuring of the target. Nonuniform color changes (characteristic of certain materials) would upset the accuracy; checks would have to be made on materials of unknown emissivity properties.

• The measurement of low temperatures also poses problems.

In cryogenic applications, the measurement of low temperatures becomes a prime consideration. Once you've found a way of getting down to ultralow levels, you need to know pretty closely where you've been if you are to evaluate results.

Determination of temperatures in the vicinity of absolute zero requires new and difficult methods. Thermocouples, gas and resistance thermometers can measure some of these values. Helium can be used in a gas thermometer down to about 11° K and resistance thermometers go about as low; thermocouples can drop a few degrees nearer the lower limit. A constant volume, helium thermometer can approach 1° K but the corrections required increase as the temperature drops. Measurements of the vapor pressure of liquefied gases have been used also.

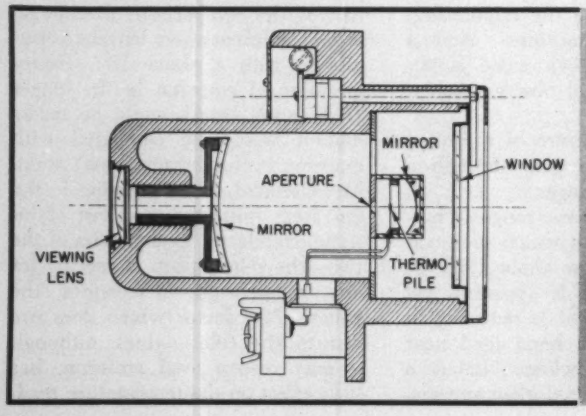
To obtain temperatures below about 1° K other methods must be employed. Scientists use the magnetic properties of certain salts, after cooling them with liquid helium. And the measurement of their magnetic properties is used to determine the temperature reached. It's a good example of how production and measurement of hard-to-reach temperatures go hand in hand.

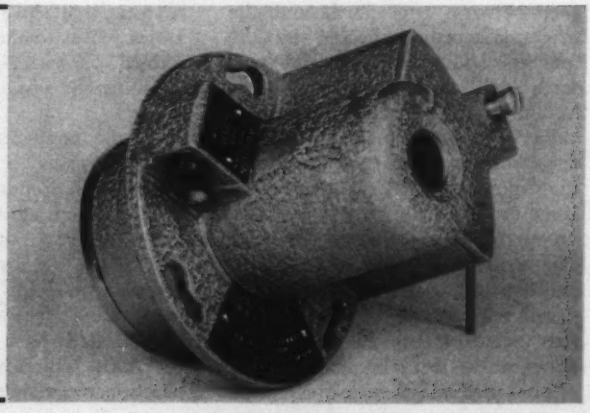
• Determination of temperatures between the freezing and boiling points of water, while not simple, can be quite precise. But extending the scales to high or low values requires elaborate and complex equipment, plus careful calculation.

The international temperature scale comprises a number of "fixed points" and a means of interpolating between the values assigned to them. The points are based upon the freezing, melting, or boiling points of high purity materials. They are quite reproducible, but their use requires special equipment and procedures. For example, the temperature at which the check is to be made must be approached slowly to avoid local temperature variations.

In practice, few users calibrate their temperature measuring equipment by comparison with fixed points. So manufacturers maintain laboratories for calibration studies, and production calibration equipment is checked against the laboratory standard. In this coun-

Radiation detection device uses double mirror system to focus radiation on thermopile. Rear lens is for sighting





try, the National Bureau of Standards, Washington, tackles the study of fixed points and temperature measurements. For a fee, it will calibrate certain types of temperature measuring devices against its standards, issuing a certificate showing the amount of deviation. It also works with the standard bureaus of other countries to set up internationally accepted fixed points and temperature scales.

Our ability to measure high temperatures accurately is improving, H. J. Kostkowski of the National Bureau of Standards told an International Symposium on High Temperature Technology at Asilomar, Calif. (It was sponsored by the Stanford Research Institute.) He mentioned many of the methods used in attacking the problems and said it was likely that the thermodynamic temperature scale would be known to 0.05 degree at 1000° K and 2.0 degrees at 4000° K within a few years. Present limits are about 1 degree and 10 degrees at the same levels.

Example of the difficulties: Two groups of scientists, one in Germany, the other in Japan, measured the melting point of gold with extreme care and claimed an error of 0.1 degree or less—but they differed by about 1.0 degree, or several times their claimed error.

• The basic fixed point, adopted internationally in 1954, is the "triple point" of water. Assigned the value of 273.16° K (degrees centigrade above absolute zero), it's the point at which water, ice, and steam or vapor can exist together.

At temperatures up to the melting point of gold (1063° C, 1945° F), the fundamental temperature measurements are based on the thermodynamic properties of gases. Above that temperature, radiation measurements are used to establish true values. The methods of measurement are related to fundamental laws of physics and chemistry. So calculations can be made on a theoretical basis. Less elaborate methods than those used in standardization laboratories will give useful results in industrial practice, where convenience, ruggedness, and cost must be considered.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Stainless steel-bonded types are available in many sizes and shapes, either rough turned or ground. Material can be machined with conventional tools

New Machinable Carbides Stand Up to 1650° F

MACHINABLE carbide with a stainless steel binder offers a new technique for making parts and tools that have to withstand high temperatures or corrosive media. Parts can be produced in the average shop.

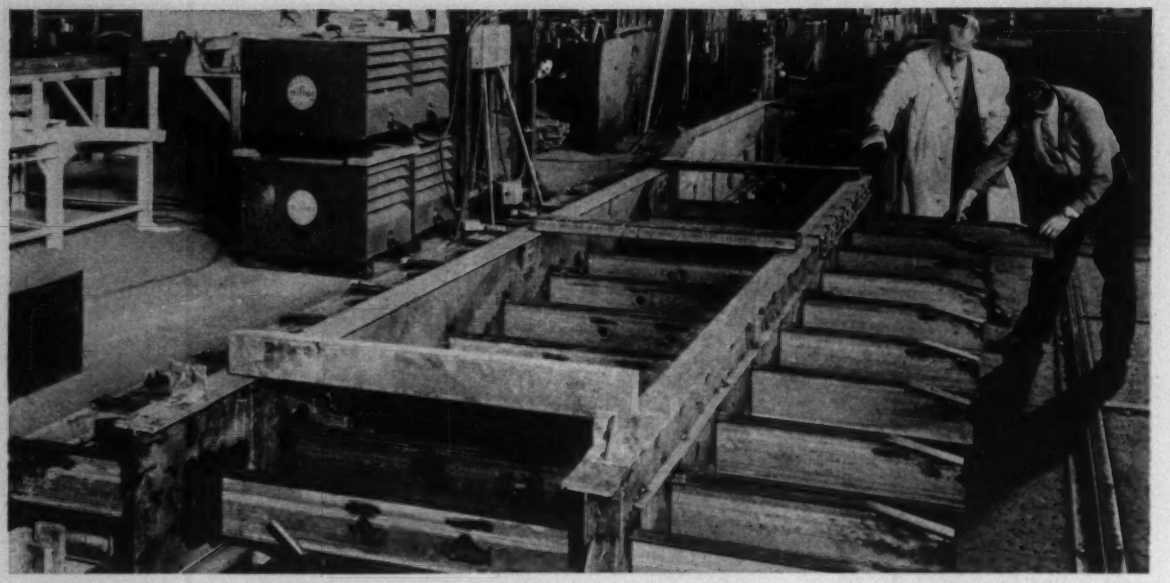
The new grades contain tiny crystals of titanium carbide embedded in a matrix of stainless steel. The manufacturer, Sintercast Div., Chromalloy Corp., Yonkers, N. Y., says the material (Ferro-Tic) combines stainless steel's machinability and heat and corrosion resistance, and titanium carbide's hardness.

Typical applications: Valves or valve seats, knives and choppers, seals for pumps, nozzles, gages, high temperature bearings, forming tools, and other products calling for resistance to heat and corrosion.

● **Properties**—The company reports stainless-bonded carbides are unusually stable at high temperatures and pressures. No flaws or cracks were produced, nor was any dimensional change caused in tools when punches made from one of the new grades (S-55) was used in tests to hot coin nickel and cobalt alloy blanks at temperatures of 1600 to 1650° F and pressures as high as 50 tons per square inch. No serious deterioration of the exposed surfaces due to oxidation was observed.

Grade numbers of the new material identify Rockwell hardness. S-45 (Rc 45) may be machined with any single or multiple point cutting tool; S-55 (Rc 55) is suitable only for the basic operations—sawing, turning, and drilling. Milling or tapping is not recommended. Both grades can be ground and welded and brazed to other metals.

Intricate parts can be machined from the material blanks quickly without resorting to specially cast or formed shapes. Also costly diamond grinding is not necessary.



Lightweight structural beams are inserted through shaped openings in the webs of longitudinal structural beams. When welded, this construction helps stiffen the web and make the frame more rigid

Frame Redesign Lightens, Strengthens Trailers

THREE CHANGES in structural design have boosted the rated load capacity of flatbed trailers made by Fruehauf Trailer Co. at its Ft. Wayne, Ind. plant.

For example, the capacity of the company's standard 35 ft model has been raised from 44,000 to 50,000 lb. Trailer weight has been reduced from 10,200 to 9190 lb. Net result: A 26 per cent increase in the load-to-weight ratio. Similar benefits were realized in all sizes.

• **First Change**—Two longitudinal structural members that are the backbone of the trailer were converted from formed channels of 7/16 in. steel plates to fabricated I-beams. The design provides a more efficient distribution of the steel because of wider and heavier flanges at the top and bottom and a web of only 3/16 in. thickness. Maximum depth of the beams was increased from $16\frac{1}{2}$ to $19\frac{5}{8}$ in.

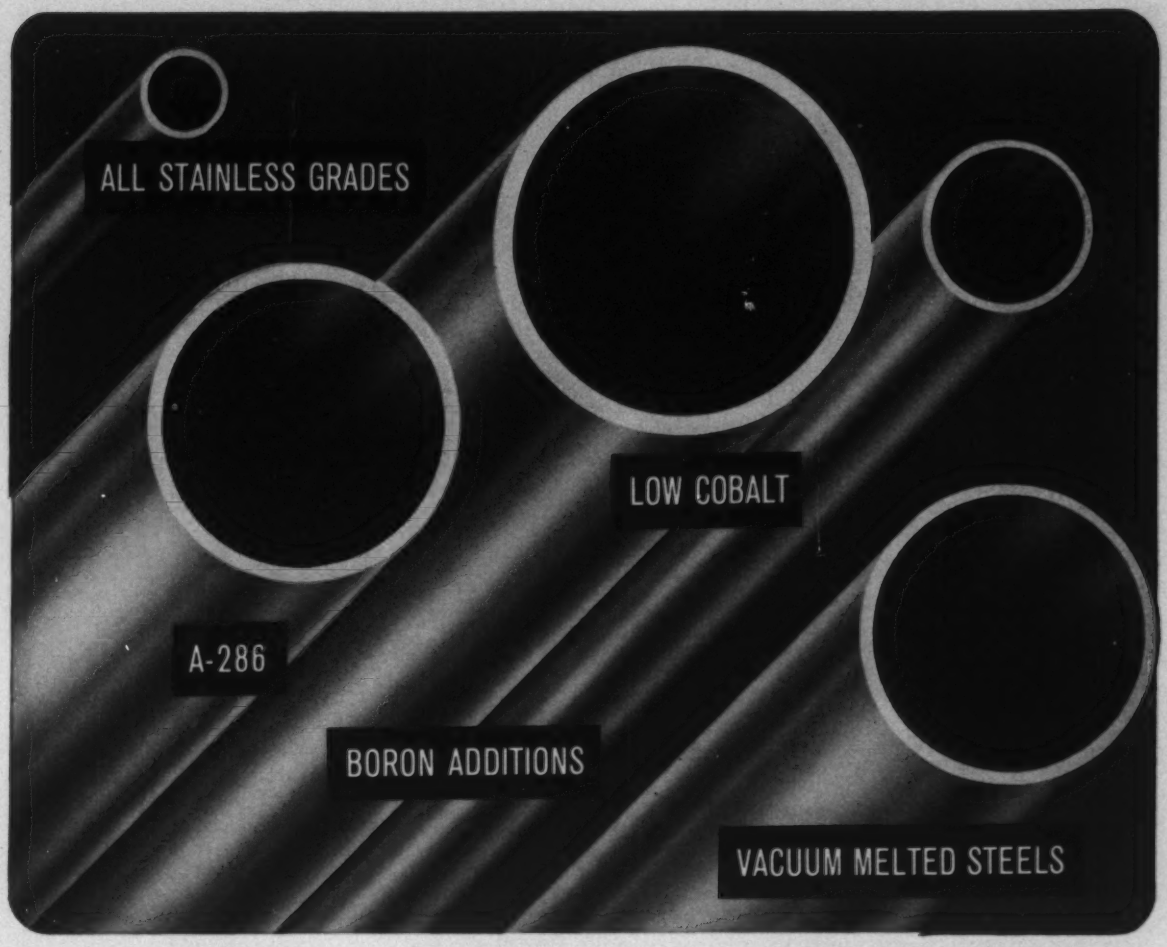
• **Second Change** — Crossmembers were changed from formed C-shapes of 7 gage steel to 6 in. Junior Beams, lightweight structurals made by Jones & Laughlin Steel Corp., Pittsburgh. The beams weigh 4.4 lb per foot; the formed shapes weighed 5.45 lb per foot, and the beams have $1\frac{1}{4}$ in. more depth.

• **Third Change** — Holes, shaped like the profile of the Junior Beams, are punched through the 3/16 in. web plates. The beams, used as crossmembers, then are inserted through the punched holes. The arrangement makes it possible to use strong welded joints that stiffen the web and increase frame rigidity.

Maximum over-all depth of the frame is reduced since crossmembers (inserted through the web) used to be laid across the tops of the longitudinal beams. Total depth now is $19\frac{5}{8}$ in. It used to be $21\frac{1}{4}$ in.

Shaped holes are punched in the 3/16 in. thick web plate. These holes take the beams that form the crossmembers

Experience *— the added alloy in* ***Allegheny Stainless***



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Allegheny Ludlum makes seamless tubing in all stainless grades including 309, 317, 318, 310, 416 and 446—normally difficult to obtain. Also available in high-strength alloys such as A-286, in vacuum melted steels, and in custom analyses grades such as low cobalt with .01 or .05 max. and small boron additions to standard types.

A-L also makes composite tubes with bonded combinations of carbon and stainless and other metals for special chlorine-corrosion applications in process equipment.

Allegheny Ludlum Stainless Tubing ranges from 3/16" OD to 3½" OD with wall thickness ranging from .013" to .375"—typical of the sizes that A-L can produce. For certain applications, .500" walls are possible. Some standard sizes in stock are 2½" OD—.032" walls, 3" OD—.042" walls and 3½" OD—.042" walls and 3½" OD—.058" walls. All sizes with true circularity, no dents or handling marks.

A-L Tubing is also available in small quantity orders, in random or cut lengths. Standard grades and sizes in stock throughout the country. Call your nearest A-L representative for all the help you need.

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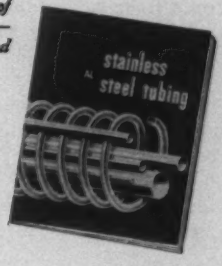
NEW! FREE—Write for your copy of Allegheny Ludlum Stainless Tubing—32-pages of technical data, grades and suggested applications.



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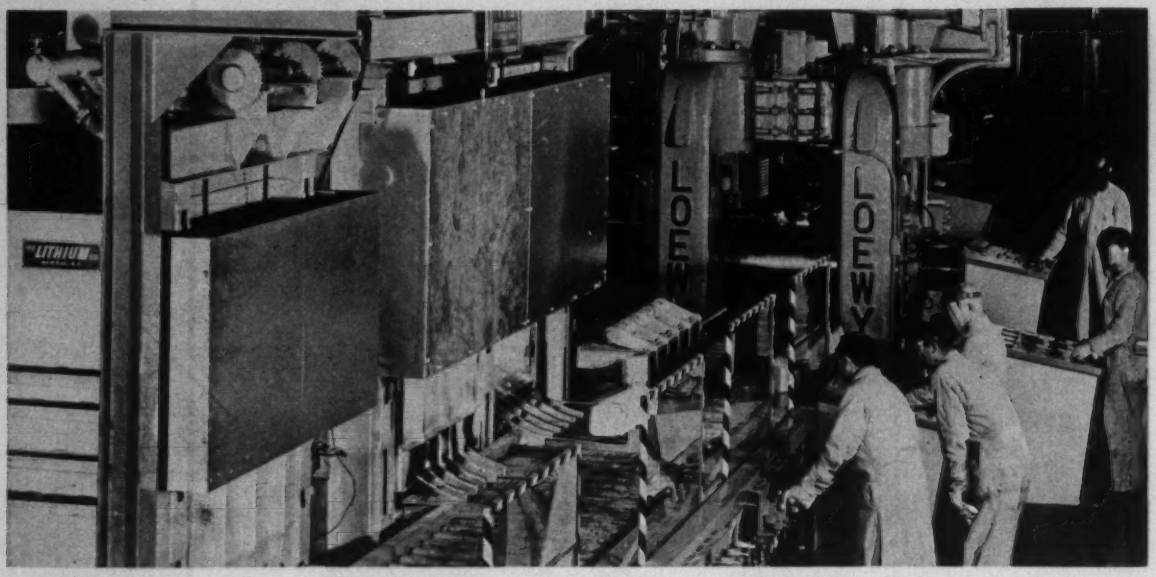


Experimental steel ingot leaves an atmosphere-controlled heating furnace and enters the hot mill at U. S. Steel's research center, Monroeville, Pa.

Steel Research Center Revamps Rolling Mills

New equipment is installed on miniature mills handling experimental steels; it permits closer simulation and study of hot and cold rolling operations

LABORATORY rolling mills at the Monroeville, Pa., research center of United States Steel Corp. have been brought up to date with new equipment.

Versatility of the modernized mills allows researchers to simulate hot and cold strip mill operation more closely, says Dr. J. B. Austin, administrative vice president, research and technology. The company's steel processing research program will be accelerated, and new Space Age steels can be developed more rapidly.

• New electronic, electrical, and mechanical equipment were installed.

A card programing setup for automatic roll positioning was installed on the two high reversing hot mill. It will insure excellent reproducibility in researchers' rolling programs.

Load cells are used on the mill to measure separating forces. Instrumentation is available to measure and record surface and internal temperatures.

Auxiliary equipment for the hot mill includes three, atmosphere controlled heating furnaces, quenching tanks, and a slow cooling furnace.

New tension reels and a forced lubrication system were installed on the center's four high, reversing cold mill. A buttwelder has been added, so coils of small steel samples can be rolled under tension. A roto-grit blasting unit, pickling tanks, and a large planer are available to clean and condition the steel.

• Modernization of the mills permits more precise control of rolling operations.

A measuring technique developed by researchers makes for more accurate reading of temperatures inside experimental steels as they are being rolled.

Holes are drilled in the steel before heating. Thermocouples are placed in the holes after the ingots are heated, but before the first rolling pass.

When the first pass is made, hot steel is compacted around the thermocouples, and exact temperature readings can be recorded for as many as 15 passes.

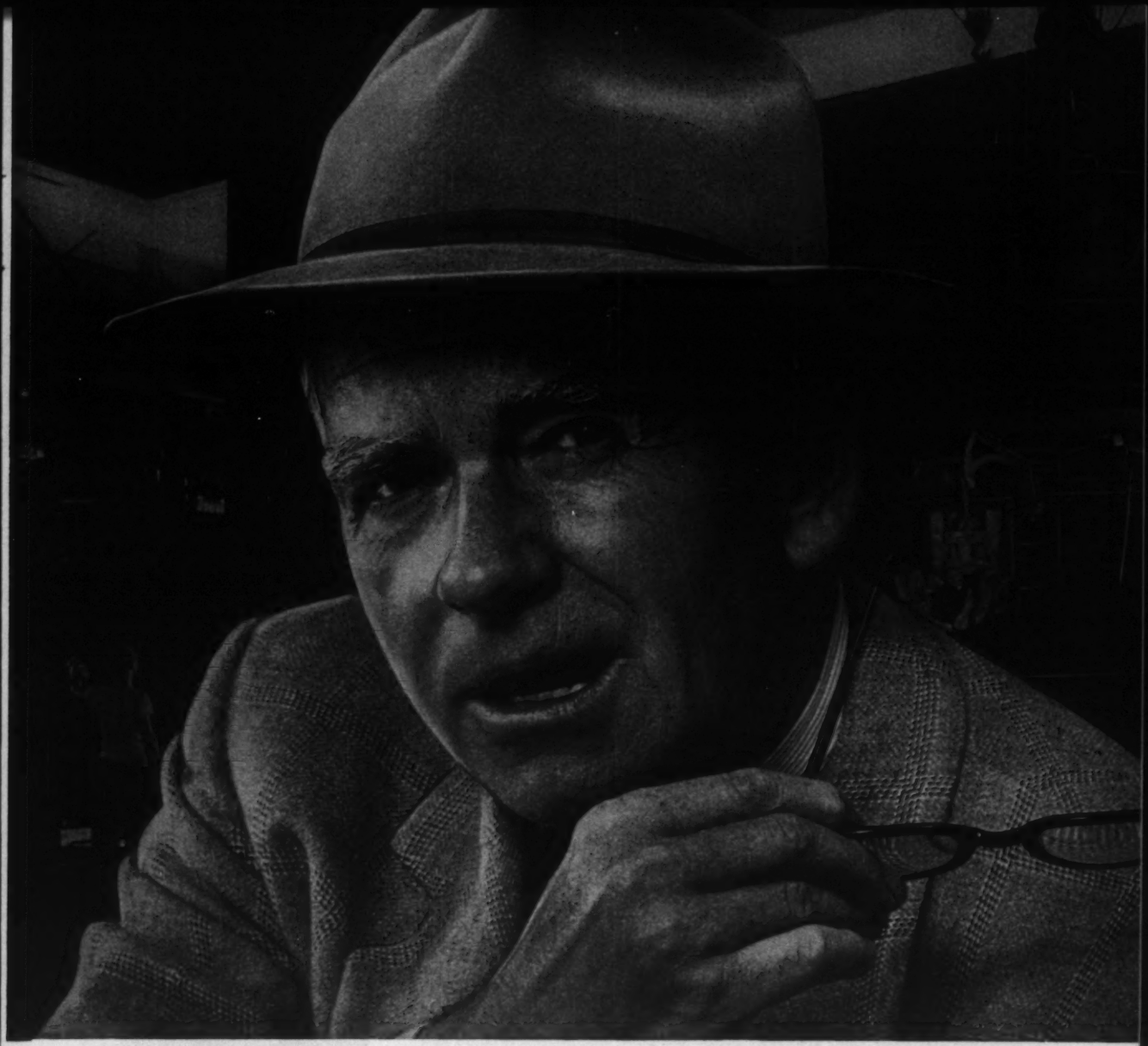
Carbide Rolls Slash Costs

Hard carbide rolls can reduce the cost of making abrasive cutoff wheels from $40 to $10 per 1000 strips, reports Kennametal Inc., Latrobe, Pa.

The rolls (6½ in. in diameter by 16 in. long) reduce a calendered mixture of 85 per cent aluminum oxide in 15 per cent rubber.

Estimated roll life is 1.5 million strips vs. 67,000 previously. Savings during the life of the rolls, based on a saving of 3 cents per strip, could amount to $45,000.

Estimated regrind frequency: Every 20,000 strips vs. 900 before.



"I stock only one high-carbon chrome—refined chrome"

Steel mill and foundry operators are cutting chromium costs by using the new ELECTROMET refined chrome for all high-carbon chromium additions. Inventory, handling, and storage are greatly simplified by stocking only this one high-carbon chromium alloy. It is ideal for use as:

- **A base charge for stainless steels.**
- **Final additions for aircraft, bearing, and tool steels.**
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Refined chrome combines the economy of regular charge chrome with the maximum cleanliness and low residual element content of conventional high-carbon ferrochrome. For facts on how refined chrome can reduce your costs, contact your UNION CARBIDE METALS representative.

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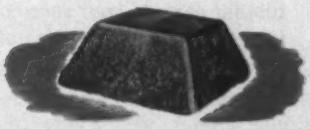

Convenient 20- and 40-pound pigs of refined chrome are magnetic, allowing easy handling with an electromagnet.

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Nowadays they're doing everything a lot easier, thanks to modern power-operated farm machinery.

And farm machinery producers have learned that their lot can be a lot easier, too, when they specify Ostuco Tubing. That's because there's no compromising with custom-quality Ostuco Tubing. Consistently you receive the exact tubing you want — the size, length, grade — with the strength and tolerances you need. For machined parts, you get our recommended rough size guaranteed to clean up.

In addition to these advantages, Ohio Seamless will fabricate tubular parts to your specification. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.

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Complimentary Copy of new Bulletin CS60 "Ostuco Steel Tubing" sent on request.

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Distributors: Ryerson & Joslyn Corp., Tube, Div.

Tape Unit Controls Tool To 0.000025 in. Increments

A new, two axis tape system controls contouring machine tools for turning, boring, and grinding in increments of 0.000025 in. or 40,000 pulses per inch of slide travel.

The system is available from the Industrial Controls Section, Bendix Aviation Corp., Detroit.

The short increments permit machining to a tolerance of 0.0001 in. in routine production of templates and 0.0002 in. in contour boring and turning operations on precision tools.

Tapes can be read at forward speeds up to 300 lines per second, at reverse speeds up to 600 lines per second.

Feed rate override permits the operator to reduce the programed feed to as little as 20 per cent of the programed rate. Variables like cutter quality, material hardness, vibration from fixture or tool, or an excessive feed rate can be allowed for without remaking the control tape.

Symmetrical parts, such as templates, may be made from the same control tape. A reversing circuit is provided for each axis which will complement or reverse the direction of machine motion from that specified on the tape.

Three auxiliary tapes automatically control such functions as coolant flow, spindle speed, and automatic grinding wheel dressing operations.

Carbide Inserts Succeed

The trend toward throw-away carbide inserts on cutting tools is still being accelerated by new successes. One took place recently at Heil Co.'s Milwaukee plant, where turning 1 in. diameter ends on 2 in. diameter, SAE 1045 steel piston rods was known as a trouble job. Close tolerances had to be held, and only one pass was allowed.

High speed steel tools cut too slowly. Brazed carbide tools boosted the speed, but frequent breakage led to excessive tool cost; tricky regrinding cost an estimated $2.50 each time. Inserts (Kennametal K4H) now turn 140 to 150 parts per edge with breaking. Tolerances are held, and tool regrinding is eliminated.

Part backlog dwindles as . . .

New Machine Speeds Up Tube End Finishing

TWO new bench mounted end finishing machines have speeded up deburring and chamfering operations on tubes by 25 per cent at Illinois Bending & Mfg. Co., Chicago. The company specializes in bending, fabricating, and machining contract work for aircraft, appliance, and missile industries.

One part is a 12 in. long steel tube with a 1½ in. OD and a 0.049 in. wall. The inside diameter has to be chamfered on both ends, 0.010 to 0.015 in. deep on a 45 degree included angle. Net production on the Pines Model 660 machine exceeds 1000 ends an hour. On the older Model 600, net production ran about 800 ends an hour.

A 6 in. long steel tube with a 1⅜ in. OD is chamfered 1/16 in. on 45 degrees; net production jumped from 560 to more than 700 with the change. Also, says Clyde Gain, general manager, the new machine can be set up 50 per cent faster; the machined finish is better; and the company is holding closer tolerances than before.

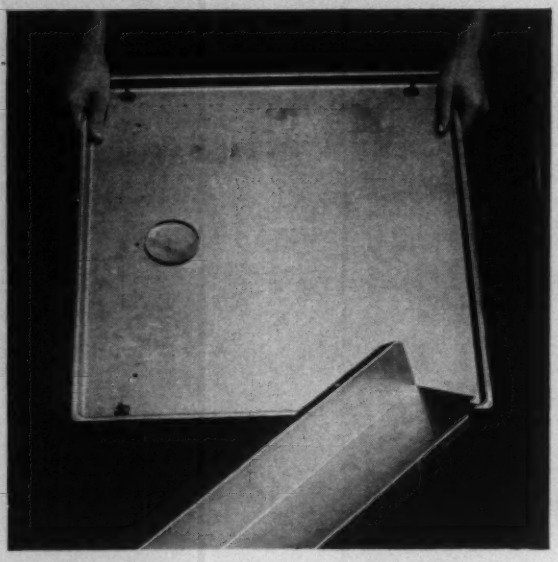
• Manufacturer's goal was to boost the machine rigidity and precision.

Engineers at Pines Engineering Co. Inc, Aurora, Ill., provided an integral mounting of the spindle and chuck jaws in a heavy, one piece casting with more than three times greater rigidity than the former model. Rigidity also adds to concentricity performance during rough cuts.

More power and torque for heavier cuts are provided with a ¾ hp totally enclosed motor.

Use of preset units for different size workpieces makes it possible to complete the change of toolholders and chuck jaw inserts within 2 minutes. Holders thread with quick-seating taper to the spindle, assuring close concentricity and accuracy. Standard toolholders use only three adjustable bits for simultaneous inside-outside deburring, chamfering, and facing and require only four sets of bits to cover the complete work range—7/16 to 2 in. diameters. A special holder covers the ⅛ to ⅝ in. range.

ARMCO STEELS FOR BETTER



Armco ALUMINIZED STEEL Type 1 Saves $2.50 Per Unit

By switching to ALUMINIZED STEEL Type 1 for various parts of their commercial frying units, a leading restaurant equipment manufacturer cut costs $2.50 on each unit. In addition, the durability of their equipment has been improved by using this hot-dip aluminum-coated steel in place of plated and painted parts.

Because it has resistance to a combination of heat and corrosion, high heat reflectivity and good fabricating properties, Armco ALUMINIZED STEEL Type 1 provides economical durability in applications such as auto mufflers, appliance parts, drying ovens, and heat exchangers.

Armco High Strength Steel Eliminates Wasteful Weight

Armco produces four grades of low alloy high strength steel that enable designers to achieve greater efficiency in the use of material and eliminate costly, burdensome weight. Each grade has high mechanical properties, but corrosion resistance and fabricating characteristics differ to provide steels that most effectively meet individual needs at least cost.

Produced in sheets, strip and plates, the durability and structural efficiency of these Armco Steels make them practical, low-cost materials for railway cars, pressure vessels, truck and tank trailers, and industrial and construction equipment subject to high stresses.

ARMCO STEEL CORPORATION, 3419 Curtis Street, Middletown, Ohio

Send me information on the following Armco Special Steels for these specific applications:_____

_____

Name_____

Company_____

Street_____

City_____ Zone____ State_____

Besides the four steels described, Armco produces a wide range of other special steels that offer you additional opportunities to improve the performance and cut the cost of your products.

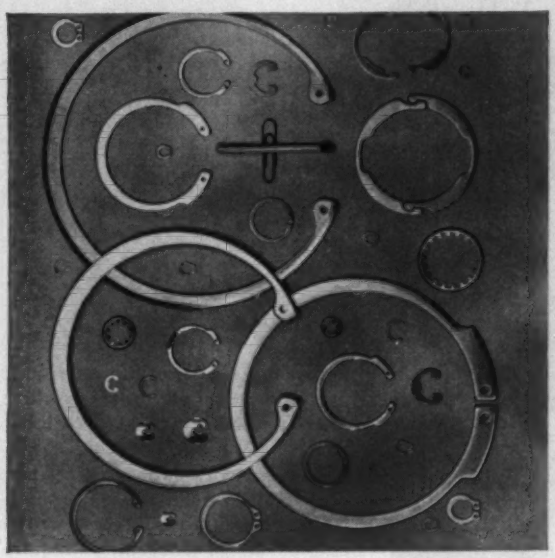
These Armco Steels include:

Armco ALUMINIZED STEEL Type 2	Armco Stainless Steels
Armco ZINCGRIP Steel	Armco Electrical Steels
Armco ZINCGRIP PAINTGRIP Steel	Armco Welded Steel Tubing

For complete information, just fill out and mail the coupon.

New steels are born at Armco

PRODUCTS...LOWER COSTS



Armco PH 15-7 Mo Stainless Steel Makes a Good Product Better

A leading manufacturer of retaining rings greatly improved the performance of his product and expanded its market by producing a complete line of rings in Armco PH 15-7 Mo Stainless Steel. The ultra-high strength, excellent spring properties, good corrosion resistance, and high temperature characteristics of this special Armco Stainless Steel make possible performance standards heretofore unobtainable at reasonable cost.

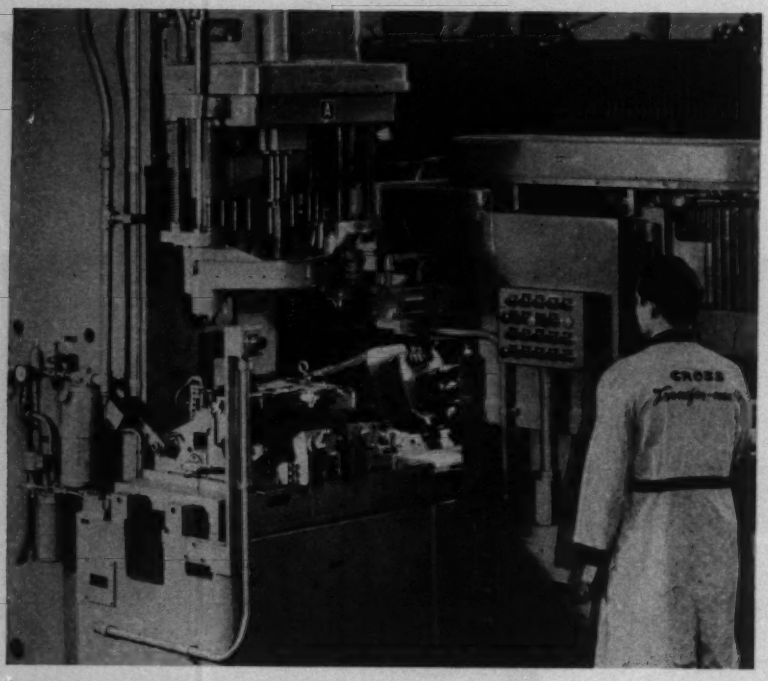
This is typical of the results obtained with Armco's Precipitation-Hardening Stainless Steels in diverse uses such as aircraft and missile components; chemical, food, and beverage equipment; and parts of nuclear reactors.

Armco Enameling Iron Cuts Costly Rejects

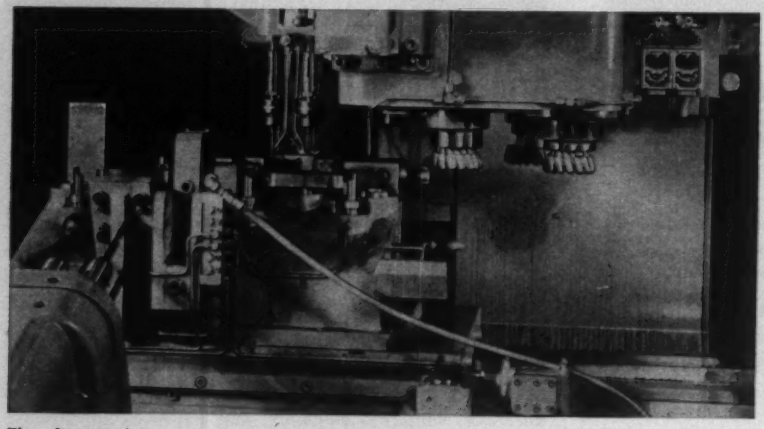
Made especially for porcelain enameling, this special Armco Steel enables designers to use all the advantages of colorful porcelain enamel and hold production costs to a minimum. The uniformly high quality of Armco Enameling Iron insures against impurities that cause enameling defects. The resistance of Armco Enameling Iron to sagging at firing temperatures keeps critical dimensions within tolerance, simplifies assembly, and improves appearance. Manufacturers of appliances, metal curtain walls, signs, and a wide variety of industrial products, find this special Armco Steel not only cuts manufacturing costs but gives them sales advantages as well.

ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation



Raw exhaust manifolds are drilled and bored in the first station (foreground), then the angular-head second station drills the tailpipe flange. Between the two stations, milling cutters work as the parts move through. Machine turns out 20 parts an hour



The fixture has moved through the milling operation and is in position for angular drilling in the second station

Wasted Handling Time Cut By Milling Parts en Route

PRODUCTION men generally regard handling time between machining operations as an unproductive gap in the manufacturing sequence.

A truck manufacturer has come up with a solution. He's doing a third of the machining on exhaust manifold castings while they move from one station to another on a special two station shuttle machine.

• A two position fixture receives parts in the first station.

One raw casting is clamped with the four exhaust port flanges up. A partially finished casting is turned end for end, rotated about 90 degrees, and clamped with the tailpipe flange up. In this first station, eight exhaust-port flange holes are drilled on the raw casting, and the central opening on the tailpipe flange of the semifinished part is finished with a boring tool.

The fixture locates the unmachined part on cast surfaces, accommodating normal casting variations. The semifinished part locates on two milled surfaces and two drilled holes.

After the cycle completes, the pallet moves automatically to the second station.

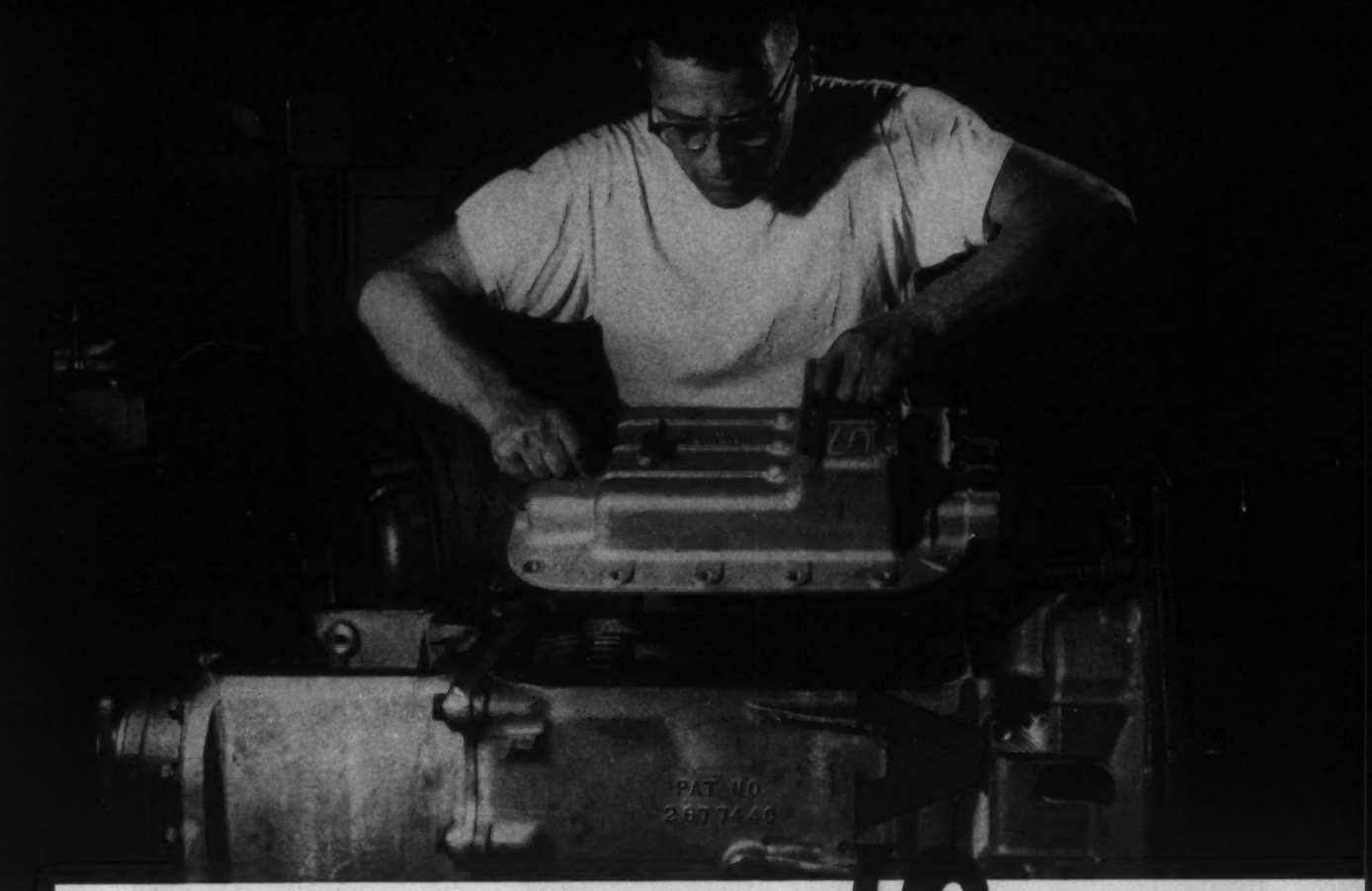
• During the transfer, the parts pass under, and are milled by three, inserted blade, carbide tipped cutters.

Exhaust port flanges pass under a roughing and a finishing cutter. Only one cutter is needed on the tailpipe flange since finish requirements are not as rigid.

In the second station, the tailpipe flange holes of the raw casting are drilled by the angular head. The same holes in the semifinished part are tapped by tools mounted on the column alongside the milling cutters. In return traverse, the milling cutters lift about $\frac{1}{8}$ in. so they don't scuff the parts.

Because of its combination of operations, the machine saves on floor space. Engineers at Cross Co., Detroit, who designed and built the machine, say any change of the tailpipe flange angle (it normally changes with each new model) can be accommodated by changing the fixturing and the angle of just one head.

Truck manifold casting is completely milled, drilled, and bored in two trips through the machine. Each cycle turns out a finished part



High strength aluminum castings without heat treatment:

TENZALOY

THE SELF-AGING ALUMINUM ALLOY

Tenzaloy is a corrosion resistant aluminum alloy that ages at room temperatures, delivers high strength properties without costly solution treating, quenching, and artificial aging. No special foundry techniques are required; no fluxes. Castability is excellent with sand cast and plaster molds, and many permanent molds. Tenzaloy castings have superior machinability, take a brilliant polish, anodize clear white. Write for TENZALOY Bulletin No. 103 to: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N. Y., or call your nearest Federated sales office.

This transmission shift housing is one of several truck engine parts now cast of Tenzaloy for high strength without weight.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

FEDERATED METALS DIVISION

Where to call for information:

ALTON, ILLINOIS
Alton: Howard 5-2511
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Chicago: Essex 5-5000
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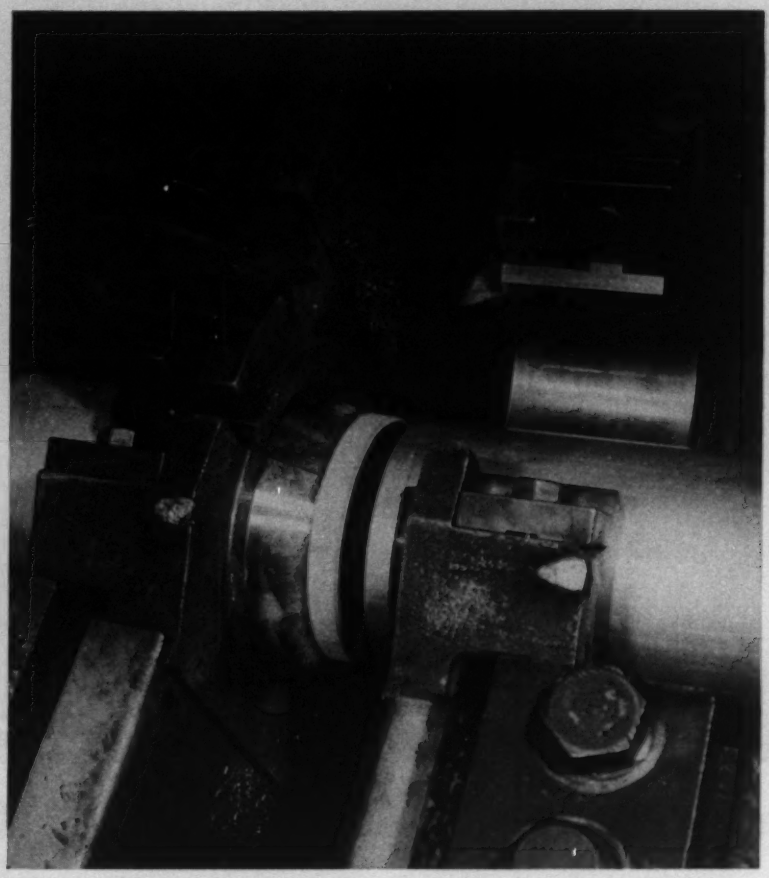
IN CANADA: Federated Metals Canada, Ltd.
Toronto, Ont., 1110 Birchmount Rd., Scarborough, Phone: Plymouth 73246

Montreal, P.Q., 1400 Norman St., Lachine, Phone: Melrose 7-3591

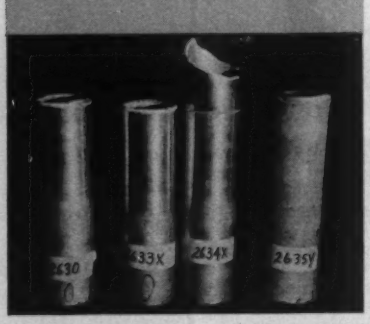
Lockheed Tells Air Force . . .

Flash Buttwelds in Aluminum Are Safe, Reliable

Comprehensive study turns up operating data which will help metalworking producers make more uniform and dependable resistance type joints in various kinds of aluminum and its alloys



Typical welder setup illustrates the kind of tooling used by Lockheed. Tubing is 5 in. 2014-T6 aluminum with a wall 0.138 in. thick.



Typical pull test samples illustrate weld properties: As welded (two at left); after aging; after reheat treatment

IF YOU'VE HAD DOUBTS about flash buttwelding of aluminum alloys, you can discard many reservations you have harbored.

Such joints adequately meet military and civilian needs, proclaim engineers at Lockheed Aircraft Corp., Burbank, Calif., who developed new techniques for the Air Force.

The developments could lead to more widespread use of the method among firms that may not have had time to evaluate the variety and type of welder settings and results.

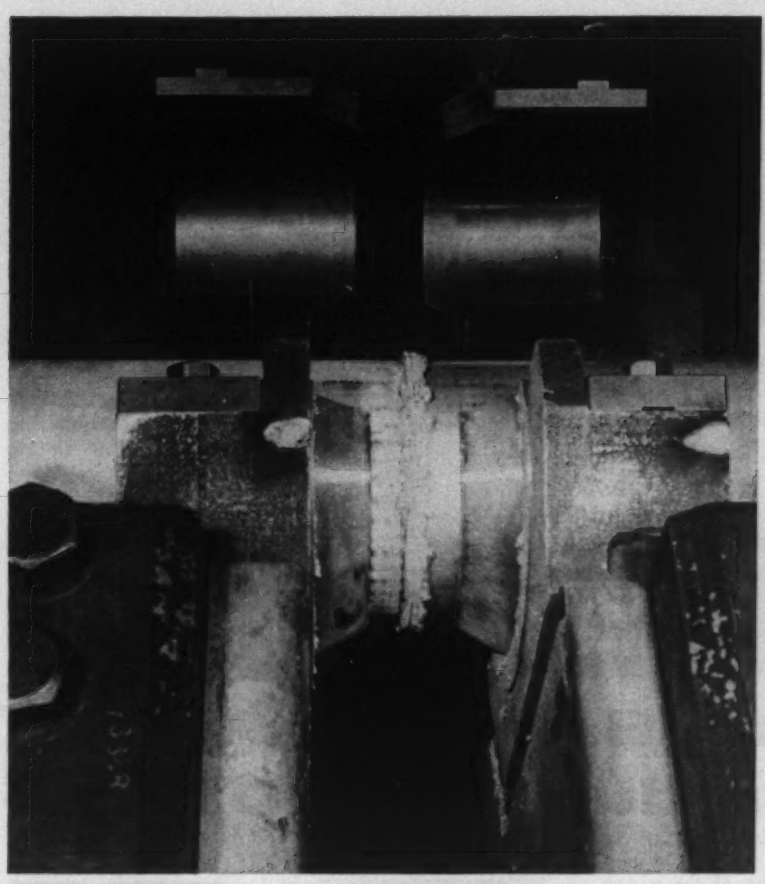
Lockheed says its experience proves that in aluminum alloys it has tested:

- Flashwelds are as strong or stronger than minimum strength of parent metals.
- Standard finishes will protect flashwelded parts.
- An offset of 10 per cent of wall thickness between two flashwelded parts has virtually no effect on fatigue strength.

Lockheed does not recommend flashwelded 7075 aluminum alloy parts exposed to stress corrosion.

• Knowledge about flashwelding such alloys as 7075, 2024, 2014, and 6061 has been restricted to those firms which have developed information for their own use. The Air Force-Lockheed report eliminates some differences of opinion about corrosion resistance, strength, and fatigue failures.

James Diefenbaugh, chief electrical engineer, Federal Machine & Welder Co., Warren, Ohio, points out that records of weld settings usually are not issued with Army-Navy specifications. Each firm is expected to develop its own data, so some disagreement is bound to occur.



Same setup after welding cycle exhibits uniform, fine flash. Hardness survey on cross section gave uniform readings which were equivalent to 135 Brinell

Here are some of the test results and conclusions drawn by the investigators:

1. You can get good welds which compare favorably with parent metal but re-aging restores strength. Room temperature aging also increases weld strength, especially in heat treated 2024.

2. Welds in annealed alloys consistently meet parent metal strength. Properly made flashwelds will respond to heat treatment.

3. Heat treating and/or aging after welding improve the tensile strength of the weld.

4. Penetrators or flat spots occur pretty much as they do in flashwelding of steel. Lockheed believes that more upset force might eliminate the problem.

5. You can expect reduced ductility in most high strength alloys. Reason: Grain orientation of the short, transverse type results.

6. Inert gas shielding does not improve weld properties.

7. Standard protective finishes retard corrosion equally well in both base and weld metal.

8. Fatigue strength of 2014, 2024, and 7075 are about the same—6061 is higher. Flush machining and/or shot peening of the weld area serve to increase fatigue strength.

9. Offset or misalignment between weld surfaces can be 10 per cent of the material thickness without affecting strength.

10. Stress corrosion tests indicate that welded 7075 is relatively poor for applications where stress corrosion is of prime concern. The 2024 alloy, aged to T6 temper after welding, exhibits usable stress corrosion life.

11. Flashwelds in high strength alloys require larger bend diameters than those specified for parent metals.

Programed Miller Keeps Parts on Schedule

A numerical control system kept production rolling while new forming tools were being made at Aeronca Mfg. Corp., Middletown, Ohio.

A Cincinnati Hydrotel, made by Cincinnati Milling Machine Co., Cincinnati, began hogging hinges out of 4340 steel blocks within days while dies were made to produce forgings of 4140.

The job was programed in about 80 hours and set up on 1800 punch cards, arranged in two decks for roughing and two decks for finishing cuts. The cards are used for both right and left hinges; the numerical control circuitry makes the necessary image conversion.

Machined conventionally, the operation would have required two master parts and constant operator attention.

The cards guide the tool and control maximum feeds and speeds. (The operator has control over speeds and feeds below the maximum set.) Other functions of the operator: Load and unload parts, change cutters and decks of cards.

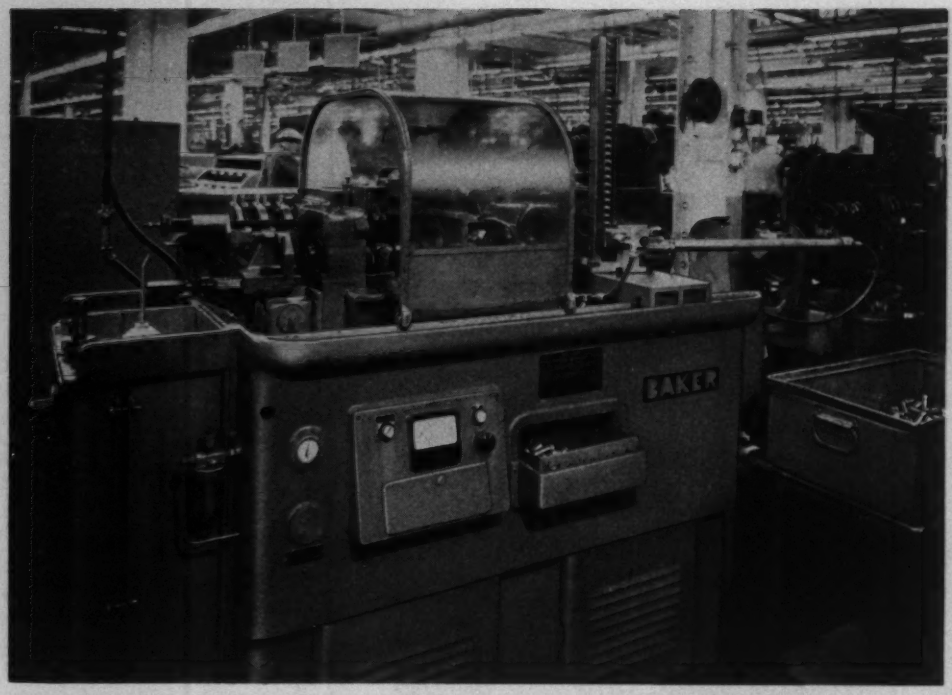
The cutters do not have to be ground to the exact radiuses for the job programed. A twist of a dial will compensate for a few thousandths undersize. Similar compensation can be made for fixture alignment.

Errors in programing were tested by inserting a pencil in the chuck and running through the cycle. The pencil outlined the horizontal contours to be cut and gave a quick visual check.

Hard Surfacing Paste Boosts Conveyor Life

A fused overlay of hard surfacing paste has increased the life of some screw type conveyors as much as 550 per cent, reports Industrial Machinery Co., Ft. Worth, Tex. The conveyors are designed for the jobs where abrasion resistance is important.

Sweat-On paste, a suspension of pure chromium boride crystals in a suitable vehicle, is applied in a thin, even coat to the conveyor's wear surfaces. Then the paste, made by Wall Colmonoy Corp., Detroit, is air dried, and finally fused with an oxyacetylene flame.



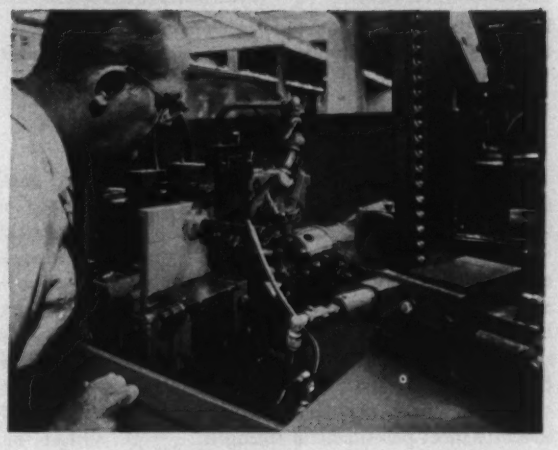
At American Bosch this BAKER® boosted production 300%

The greater speed and ease of operation of the BAKER has given a 300% increase in the production of delivery valve holders, according to American Bosch Division, Springfield, Massachusetts. This leading manufacturer of Diesel fuel injection systems bought the BAKER AUTOMATIC BAR MACHINES two years ago as replacements for manual machines.

"With a manual machine," reports the foreman in charge, "the operator had to change gears to increase or decrease the rpm. The job took ten minutes. With the BAKER, he merely turns a dial. The BAKER, running three shifts, *paid for itself in one year.*"

The former manual machines required an operator for each. Now, one man operates five BAKER machines.

For details on how BAKER AUTOMATIC BAR MACHINES can increase production and cut costs in your plant, write BAKER BROTHERS, INC., DEPT. SB-360, 1000 POST STREET, TOLEDO 10, OHIO.



BAKER®

AUTOMATIC BAR MACHINES

MMT-PE

STANDARD AND SPECIAL DRILLING AND TAPPING MACHINES • COMPRESSION MOLDING MACHINES

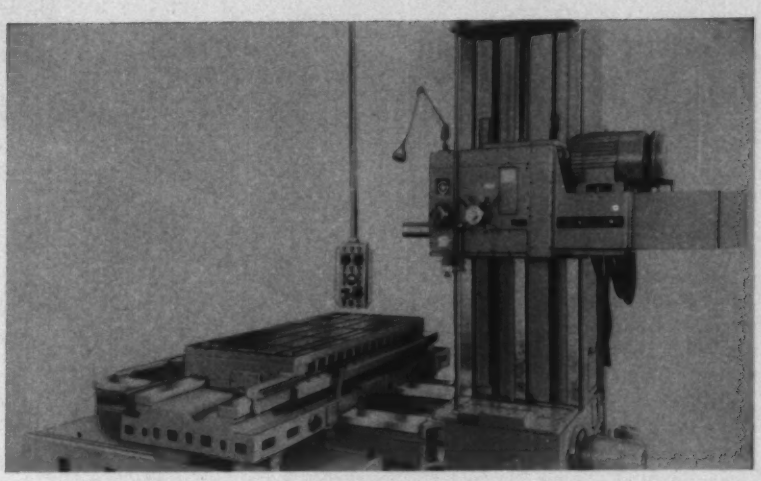
Machine Has Joy Stick Milling Feed Control

YOU GET pendant control of machine functions, joy stick milling feed control, a three way column, and a motorized headstock with this 6 in. horizontal boring, drilling, and milling machine.

Independent (and combination) saddle and spindle feeds are provided for smooth, uninterrupted machining of long bores. Head, table, and saddle milling feeds can be operated independently or in combination.

Spindle feeds and speeds may be preselected while the spindle is running.

The machine can be ordered with automatic control systems or a standard unit can be factory modified for later fitting with Numeripoint control. Several types of table and saddle arrangements are available. You can choose from optional equipment, such as measuring and coolant systems, chip conveyors, special tables, and controls.



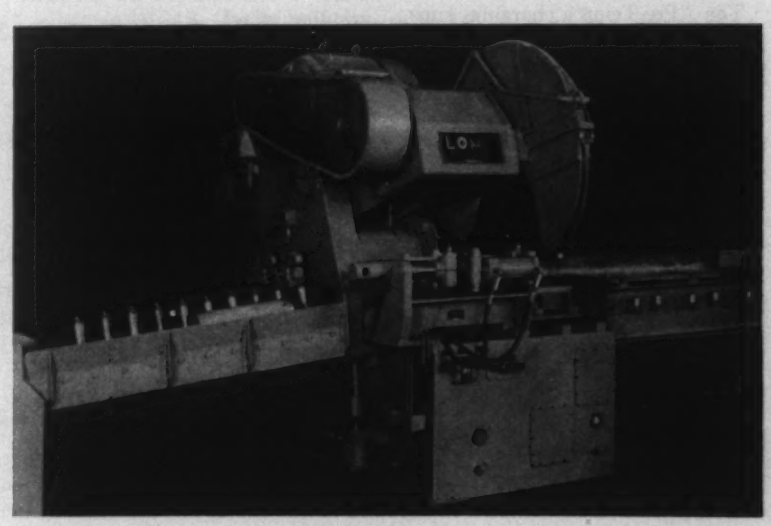
For further information, *write* Giddings & Lewis Machine Tool Co., 126 Doty St., Fond du Lac, Wis.

Billet Cutoff Saw Handles Diameters up to 16 in.

ONE OPERATOR can cut large aluminum alloy billets fast with the Loma hydraulic circular saw. Close length tolerances and ultrasmooth surfaces are maintained. Billets up to 16 in. in diameter can be cut with a 48 in. diameter blade. The driving motor is rated at 75 hp.

The machine has a tilt arm and the blade moves down to eliminate chatter during the cut. The feed pressure is taken by the housing. Saw blade rotation carries chips and coolant away from the operator to an automatic chip conveyor system.

You can set up an automatic cold sawing operation by adding mechanical handling equipment such as a billet storage table (with an



escapement feed), a powered feed roller conveyor, an automatic length gaging stop, and a gravity discharge roller conveyor.

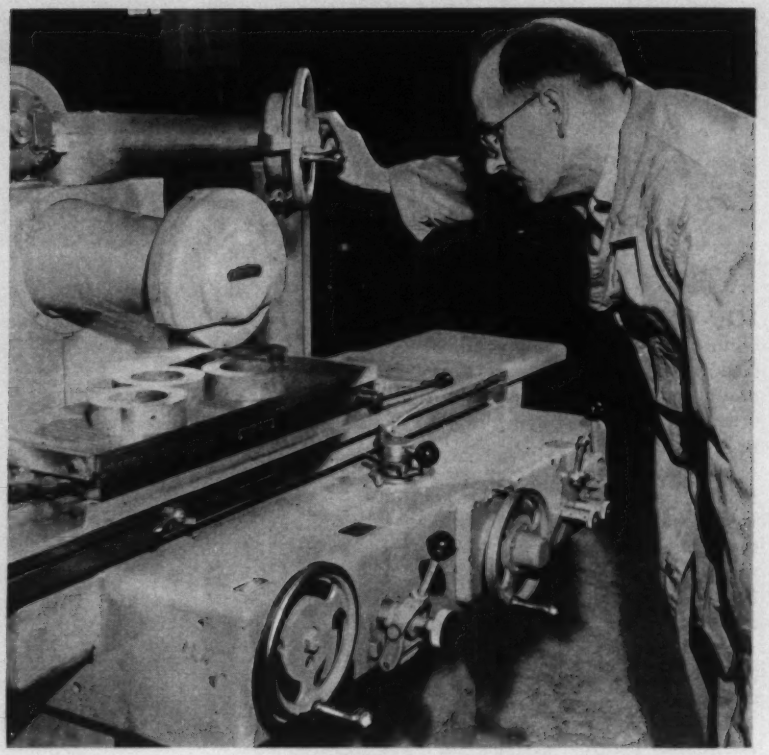
For further information, *write* Loma Machine Mfg. Co. Inc., 114 E. 32nd St., New York 16, N. Y.

Automatic Tumbling Unit Pays for Self Quickly

DEBURRING, radiusing, and finishing of small parts can be done with an automatic tumbling machine called the Handee Slide-Abrader.

The maker says it can often pay for itself in 15 runs. After the machine is loaded, set, and switched on, the operator is free for other duties. The unit weighs 64 lb.

For further information, *write* Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.



Surface Grinder Reduces Grinding Time

EASIER operation and increased table speeds are claimed for Norton's Type S-3 surface grinder (available in the 8 x 24 in. size). Grinding time has been reduced as much as 50 per cent and work burning, checking, and cracking have been lessened. Maximum table traverse speed is 125 fpm. Workpieces as high as 13¾ in. can be ground under a standard 10 in. diameter grinding wheel.

A centered reversing lever lines up the table dogs with the work ends. The dogs are set with finger pressure (no hammering needed). Continuous cross feed (without table reciprocation) makes truing and setting up easier.

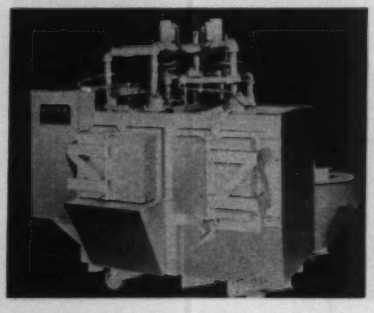
You can get such optional equipment as a vertical power positioning unit, magnetic or electric chucks, a dust collection unit, integral motor spindle, wheel guard truing, and automatic downfeed.

For further information, *write* Norton Co., 50 New Bond St., Worcester 6, Mass.

Aluminum Melting Furnace Designed for Diecasting

LOW POROSITY aluminum castings can be produced with the Kozmo melting furnace (Model RSHCH). The unit is designed for aluminum diecasting machines. The "Pre-Temp" charging and subsurface metal flow help eliminate hydrogen pickup and oxide inclusions and maintain the metal at an extremely high purity level.

The "Pre-Temp" charging knee prevents the aluminum ingot from entering the bath until it is plastic. Radiant panel firing provides fast, uniform heat distribution. Flame impingement is eliminated and fuel costs are reduced. The furnaces are available in a wide design and capacity range.

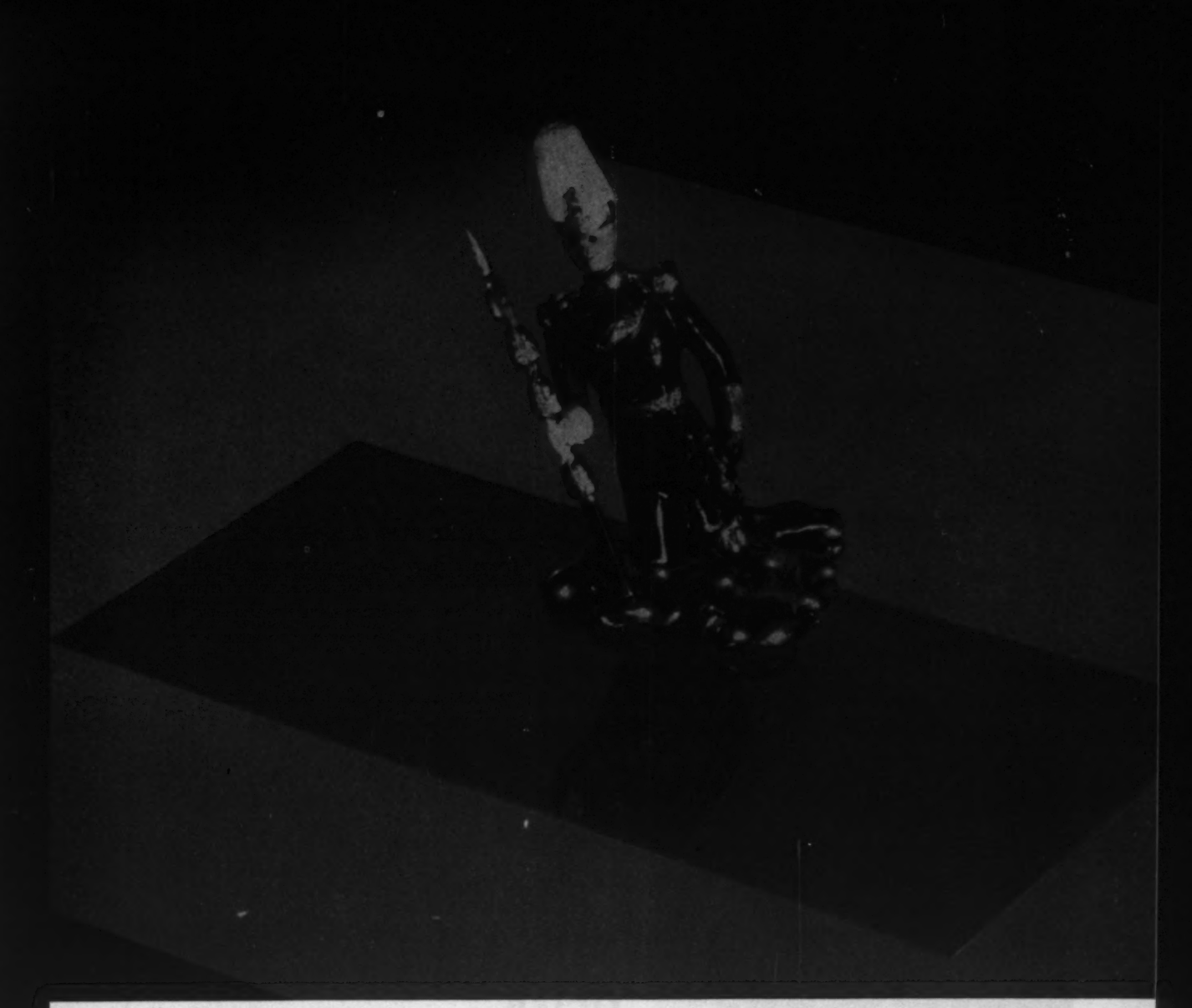


For further information, *write* J. A. Kozma Co., 2471 Wyoming Ave., Dearborn, Mich.

Proximity Switch Detects Malfunction, Stops Press

PRESS malfunction can be detected and equipment stopped automatically with the Robotron proximity switch press control. It can be used on any press or other equipment having a dog, pin, or air clutch that is either electrically operated or can be modified to electrical operation.

Metal parts passing through (or by) a detection coil hold a relay contact closed for a preset length of time. If a part doesn't pass within the interval, the relay opens and the press stops. A fail-safe, high frequency oscillator and electronic timing circuit are used. The unit



The coating that heat can't fade away

A Glidden RUSTMASTER H.R. coating was applied to an outdoor hot plate. One year of 900° F. surface temperatures *and* constant exposure to all kinds of weather had no adverse effect on the heat and water resistant film. Unlike the old lead soldier the coating was unharmed.

This unique *outdoor* hot plate test, the only one of its kind, is just an example of the many ways all Glidden coatings are tested and proven.

Glidden Protective Maintenance Coatings are designed and specifically test-proven to match particular requirements wherever protection of chemical, railroad, petroleum, marine and industrial equipment is a problem.

QUALITY Glidden PRODUCTS

COATINGS FOR EVERY PURPOSE

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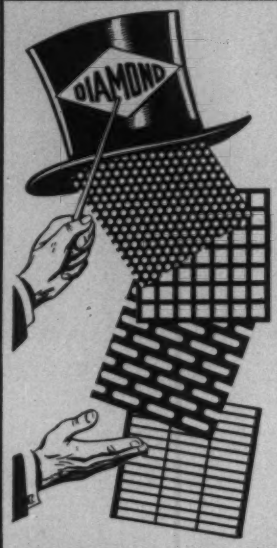
INDUSTRIAL PAINT DIVISION
900 Union Commerce Building • Cleveland 14, Ohio
In Canada: The Glidden Company, Ltd., Toronto, Ontario

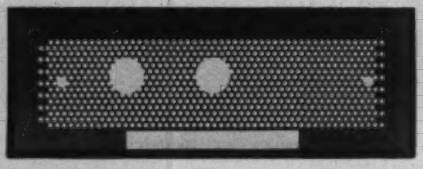
Write for your free copy of booklet containing complete information on all Glidden Protective Maintenance Coatings.



ANYTHING
IN
Perforated Metal

We're not magicians but, in nearly half a century of successful experience, have acquired such a wide range of dies, tools and other plant facilities that almost anything in the way of perforated metal sheets, plates, or parts can be produced efficiently and economically.

Our new 32-page **"Catalog 59"** illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern industrial applications. Write for a free copy and let us quote on your requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions—without charge or obligation.

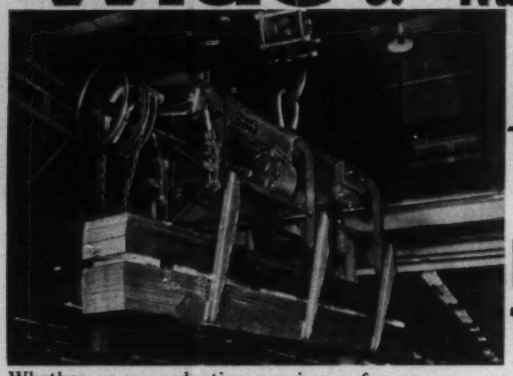


Control Panel for Electric Range. We fabricate special panels or parts to any desired extent.

DIAMOND MANUFACTURING COMPANY
WYOMING, PENNA.
(WILKES-BARRE AREA)

Manufacturers of DIAMOND Perforated Metal Panels for Modern Acoustical Ceilings.

Wide *or* Narrow...

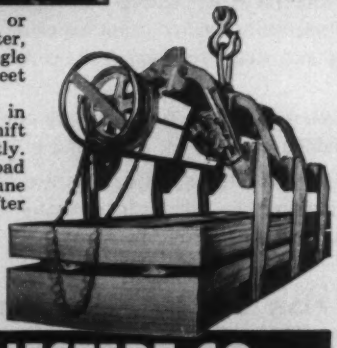


1 C-F LIFTER HANDLES THEM ALL

Whether your production requires a few or many widths of sheet steel, 1 C-F Lifter, with its wide range of jaw and carrying angle adjustments will probably meet all your sheet handling requirements.

Adjustments are made by the operator in a few seconds, permitting the Lifter to shift from wide to narrow sizes almost instantly.

Because it can pick up, carry and unload more loads per hour, using less man and crane time than any other method, a C-F Lifter will soon pay for itself.



Bulletin SL-30 gives you the complete story of C-F Lifter advantages to you. Ask for it today. There's no obligation.

CULLEN-FRIESTEDT CO.
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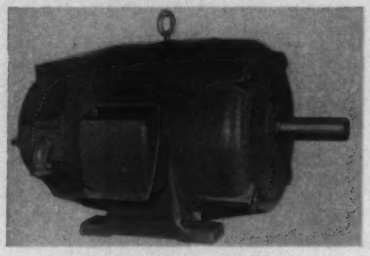
NEW PRODUCTS and equipment

can also operate a production counter. It's available with an air ejection tube and in coil sizes and types to meet requirements.

For further information, *write* Robotron Corp., 21300 W. Eight Mile Rd., Detroit 19, Mich.

Wound Rotor Motors Have High Starting Torque

WOUND ROTOR induction motors with special starting characteristics for adjustable or constant speed drives have been developed by Westinghouse. Standard ratings are available in frame sizes 254 through 326 (from 2 to 30 hp, up to 1800 rpm).



The units have high starting torque and low starting current requirements. A Class B insulation system increases thermal stability. It has good resistance to moisture, chemicals, and dirt. Sealed ball bearings are used. Leads are supplied for external connection to 220 or 440 volt lines.

For further information, *write* Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

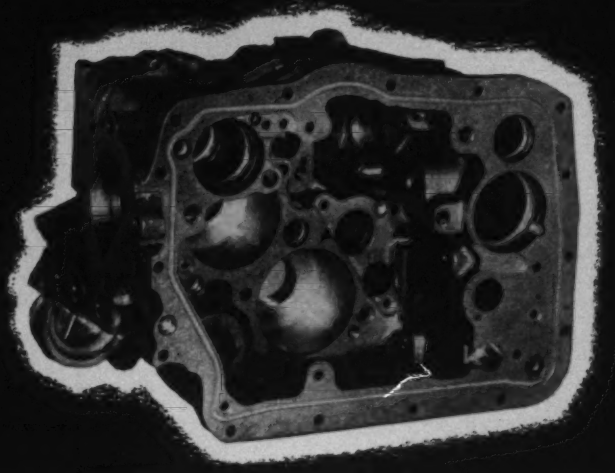
Vacuum Furnace Makes Hot Hardness Tests

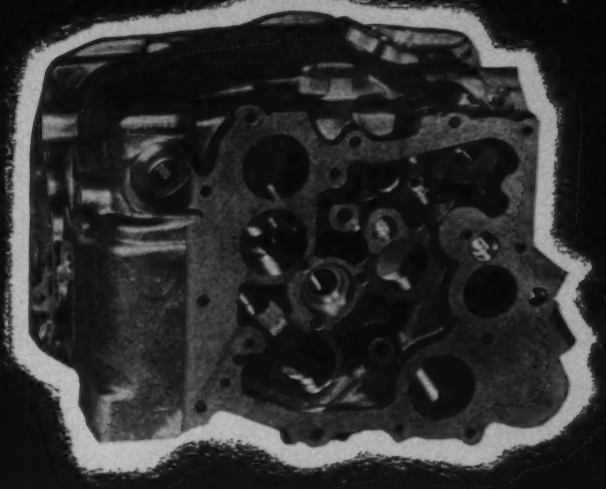
HARDNESS TESTS at temperatures up to 3000° F can be made in the Marshall vacuum furnace. A cylindrical sheet of molybdenum (3 in. ID, 12¾ in. long) is used as a heating element. The element and the radiation shielding can be removed as a single unit for cleaning and polishing of the plated tank interior. The loading mechanism is within the vacuum system.

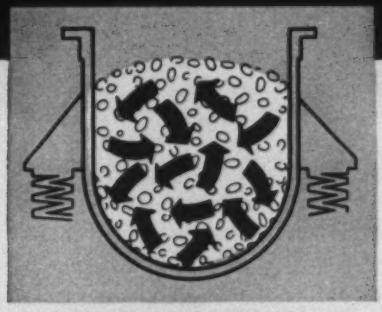
The unit uses special transforming equipment and operates on about 7 volts ac, single phase, 1400

(*Please turn to Page* 120)

CALL ON **ROTO-FINISH RANSOHOFF** FOR *Finishing Results* LIKE THIS . . .







CONSTANT OVERALL ABRASIVE ACTION—The Vibratron work zone extends throughout the abrasive mass. Every surface is subject to constant vibrating abrasive action.

NO MORE MANUAL HANDLING of parts and media. A built-in removable separator does the job. There's no need for an extra separator.

COMPLEX ALUMINUM CASTINGS DEBURRED 2 at a time . . . in 15 minutes . . . . . the **VIBRATRON** way!

Woodward Governor Co., Rockford, Ill., long a leading manufacturer of all types of governors for prime movers, manufacture such highly precise equipment as jet engine fuel control systems. Precise finish and dimensional tolerances are a must! The fuel control shown above was previously hand deburred and then tumbled in a multiple compartment machine for 1 hour. Now . . . these cases are processed *2 at a time in 15 minutes* in the Vibratron. No hand operation is required and the finish is more uniform.

IF YOU NEED HELP ON A FINISHING PROBLEM, *Write or Phone today* **FOR FULL PARTICULARS. IT WILL PAY YOU TO GET THE FACTS ON VIBRATRON PROCESSING.**

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FOREIGN REPRESENTATIVES: ARGENTINA—Taller—Buenos Aires ● AUSTRALIA—A. Flavell Ltd.—Cheltenham ● BRAZIL—Commercial E. Industrial de Fornos Werco, Ltd.—Rio de Janeiro ● CANADA—Canadian Hanson & Van Winkle Co., Ltd.—Toronto ● ENGLAND—Roto-Finish Ltd.—Hemel Hempstead ● FRANCE—Societe Roto-Finish—Paris ● GERMANY, AUSTRIA, NORWAY, SWEDEN, SWITZERLAND—Metallgesellschaft A. G.—Frankfurt, a. M.—Germany ● HOLLAND, BELGIUM, LUXEMBURG—N. V. Roto Finish Maatschappij—Delft, Holland ● ITALY—Societa Roto-Finish a R. L.—Milan ● MEXICO—Enthone de Mexico, S. A. Prol Pino 669, Mexico 15, D. F. ● SPAIN—Instituto Electroquimico, S. A.—Barcelona

The lady is a killer

Tough, fast and maneuverable, this is 60,000 tons of fighting ship. She's the Navy's newest and biggest jet-age aircraft carrier—the USS Independence.

Stowed inside her gargantuan hull are approximately 100 deadly jet fighters. Her armor-plated flight deck stretches 1,000 feet and laps an area of 4 acres. And, she's equipped with four catapults that can snap four jets howling into the air in thirty-eight seconds.

She's fast. The lady easily batters through foam-tipped waves at better than 30 knots. She's maneuverable. The Independence can follow a difficult zig-zag pattern and still cruise a distance of 600 miles in a twenty-four hour period.

To help transmit her great power from eight massive boilers, National Tube supplied over 16,000 feet of USS

National Seamless Pressure Tubes in both carbon and alloy steels for use in steam lines, as well as over 4,000 feet of Standard Pipe. In addition, National Tube also furnished a number of Seamless Steel Cylinders for air actuating systems and recharging breathing units.

For the past 80 years, National Tube has handled tough tubular installations in the fields of line pipe, pressure tubing, mechanical tubing and oil country tubular products. For assistance, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

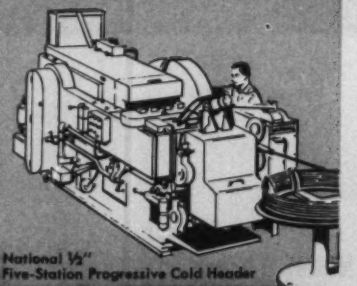
National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

These important parts are cold-formed from coiled wire, start to finish in compact, efficient National Cold Headers.

The top three are formed with no scrap loss, ready to use! All six achieve remarkable savings over past methods.

If you make odd-shaped parts, may we help you evaluate them for cold-forming from wire? Better yet, come to Tiffin, witness our demonstrations and let's discuss your work.



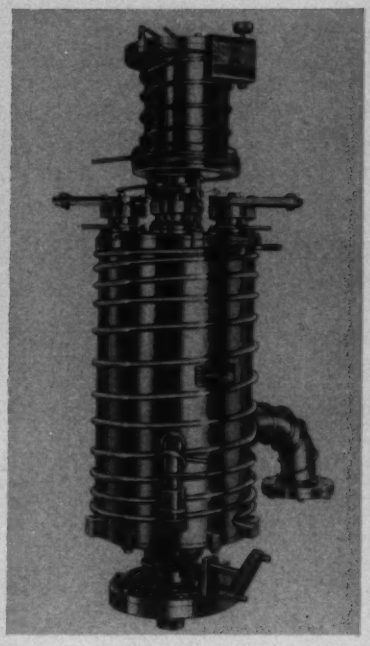
National 1½" Five-Station Progressive Cold Header

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U.S.A.

HARTFORD DETROIT CHICAGO

NEW PRODUCTS and equipment



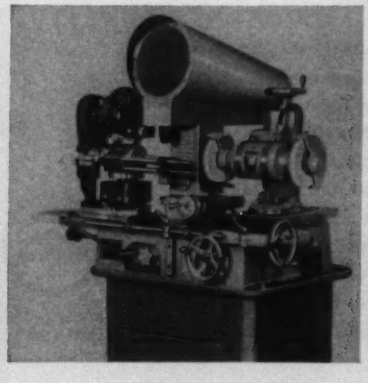
(*Concluded from Page* 116)

amperes. Maximum input to the heating element is 12 kw. You can get the unit separately, or as a complete package test setup of furnace, vacuum equipment, temperature control and electrical equipment, furnace support stand, and sapphire indenter.

For further information, *write* Marshall Products Co., 270 W. Lane Ave., Columbus 2, Ohio.

Optical Comparator Uses 20X Magnification Lens

AN OPTICAL comparator developed by R-O Mfg. Co. can be mounted on R-O and other grinders. The 9 in. diameter screen is mounted



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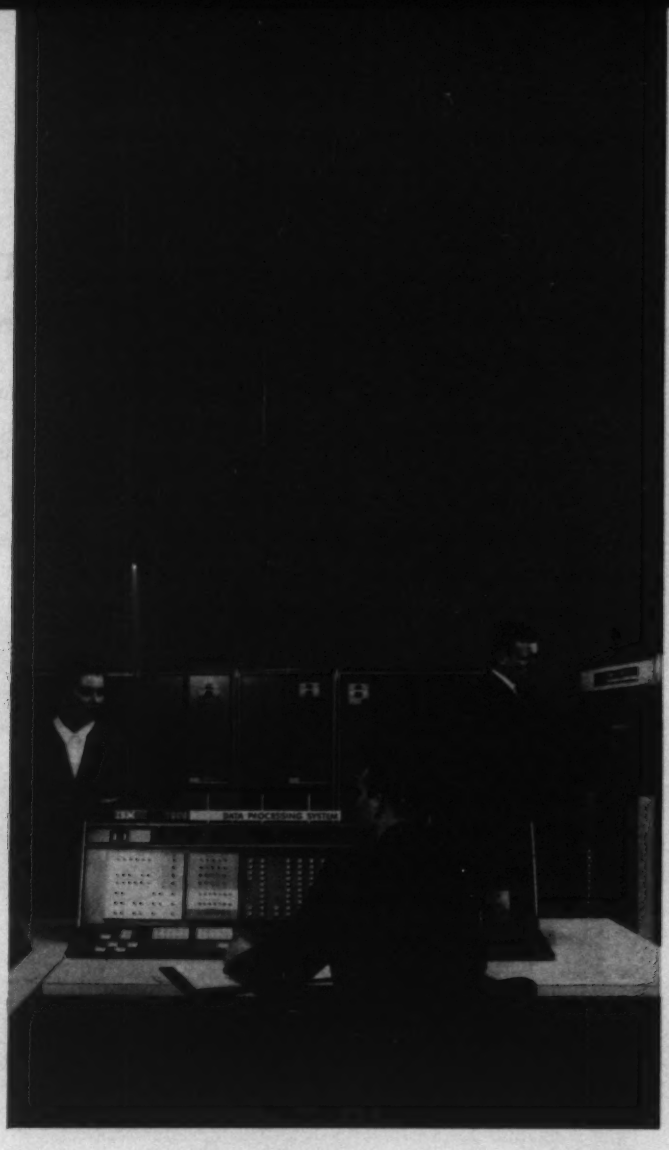

Announcing IBM's newest, most powerful business computer...

NEW IBM 7080 *transistorized data processing system*

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2.18 millionths of a second operating cycle

NEW
1.09 millionths of a second communication cycle

NEW
automatic overlapping of multiple operations

PLUS
compatibility with all IBM 705 Systems

IBM 7080 DATA PROCESSING SYSTEM BRINGS WITH IT THE WHOLE LIBRARY OF 705 APPLIED PROGRAMS

A business system with new speed and power, the transistorized IBM 7080 processes IBM 705 programs up to **ten times** faster.

This fully transistorized 7080 System offers a choice of 40,000, 80,000 or 160,000 characters of magnetic core storage.

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For manufacturing—one system to do:
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balanced data processing

Balanced Data Processing means IBM Services as well as machines—a continuing responsibility of IBM to its customers.

RANSBURG

What Would Paint Savings Like This* Mean in YOUR Finishing Department?

Quality is all important in the production of fine Metalcraft furniture by George Koch Sons, Inc., Evansville, Indiana.

That's why they use the Ransburg Electrostatic Hand Gun to apply a uniform clear coating on their brass-plated furniture. The protective coating is baked on. Although the bulk of their present production is in the popular brass line, they still paint the metal furniture in a variety of colors with the Hand Gun.

Painting is CLEANER ... QUICKER ... CHEAPER *with the Ransburg Electrostatic Hand Gun.*

These chairs and table are typical of the Koch line of metal furniture.

*10 GALLONS OF PAINT NOW DOES THE JOB WHICH FORMERLY TOOK 30 GALLONS

On one item—a TV table—they formerly used 30 gallons of enamel to coat 1000 units by combination dip and air spray method. Now—with the Ransburg Electrostatic Hand Gun, they paint 1000 tables with only 10 gallons. And, they get a better, more uniform coating, too.

NO REASON WHY YOU CAN'T DO IT, TOO!

See how the Electrostatic Hand Gun can save time . . . paint . . . and cut costs in YOUR finishing department. Or, if your production justifies, it'll pay you to investigate Ransburg's automatic electrostatic spray painting equipment. Write for our No. 2 Process brochures which show numerous examples of modern production painting in both large and small plants.

RANSBURG

RANSBURG
Electro-Coating Corp.
Box-23122, Indianapolis 23, Indiana

NEW PRODUCTS and equipment

in a protractor ring which is graduated and equipped with a 5 minute vernier.

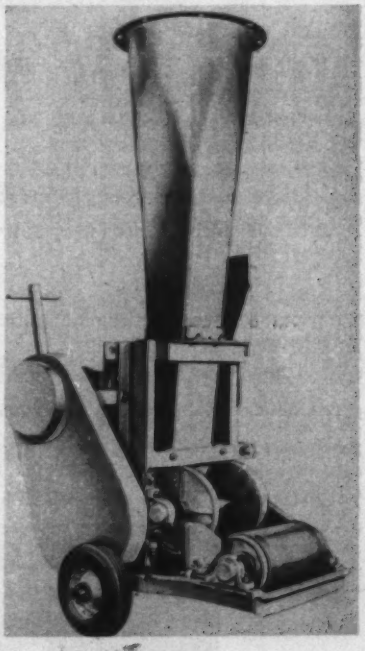
A 20X magnification lens and a 20X toolmaker's chart are furnished. Other lenses are available. A green filter emphasizes the image and prevents eye strain. The light system can be dimmed when not in use for checking. A horizontal table measuring device can be supplied as an accessory. It mounts along the leading edge of the table and relates the tool to the grinding wheel and the chart on the screen.

For further information, *write* R-O Mfg. Co., 31171 Stephenson Highway, Madison Heights, Mich.

Unit Hurls Material into Trucks, Storage Areas

SHORT, high speed belts which can hurl free flowing bulk materials into inaccessible areas are used in the Link-Belt Jetslinger. The units can stockpile material indoors or outdoors, load boxcars and trucks, or trim ships. Several different models are available.

You can order Jetslingers with belt widths of 14, 20, and 28 in. and with capacities up to 700 tons per hour (for materials weighing 50 lb



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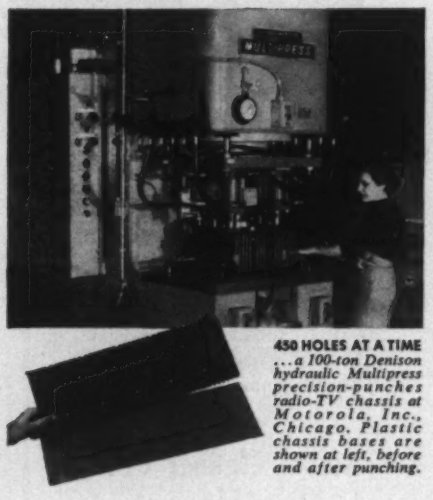
registered trademarks of Denison Eng. Div., ABSCO

DENISON HydrOILics

How MOTOROLA punches TV chassis faster and cuts scrap loss. Typical of how a Multipress Analysis Program can help you MAP superior production methods.

NO SCRAP



450 HOLES AT A TIME ...*a 100-ton Denison hydraulic Multipress precision-punches radio-TV chassis at Motorola, Inc., Chicago. Plastic chassis bases are shown at left, before and after punching.*

NO SCRAP problems on this pressing job. And Motorola radio-TV plated-circuit plastic chassis bases produced at this Chicago plant are precision-punched faster . . . more accurately . . . at less cost with Denison hydraulic Multipress.

Here's why: With one quick ram stroke, a 100-ton Multipress punches up to 450 holes at a time in each base. Multipress does the job with *no shock* . . . with absolute control after break-through. Holes are clean and smooth . . . affording the necessary, uniform plating surface inside each hole. There's *no bulging* . . . *no cracking* around or between holes because Multipress delivers controlled hydraulic pressure.

Plus benefits with Multipress—longer die life . . . almost no punch breakage . . . handles 15 different dies for quick changeover to other full-production jobs . . . *and there's almost no scrap loss.*

Endless jobs throughout the electronic and other industries can be done better . . . for less with Denison hydraulic Multipress—capacities from 1 to 100 tons. Ask your Denison Production Specialist to show you how with a **M**ultipress **A**nalysis **P**rogram made in your plant now—at no cost. It's the first step to **MAP** new savings in your production operations.

DENISON ENGINEERING DIVISION
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PUMPS • MOTORS • CONTROLS

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NOW...
select from a complete range of capacities and speeds...1/8 to 2 tons and 8 to 60 fpm.

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NEW MODELS in 1/2, 1 and 2 tons

LODESTAR FEATURES INCLUDE:

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- Self-Adjusting Magnetic Brake
- Ultra-Modern Electric Braking
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Request catalog and name of local stocking distributor.

LARGER CAPACITY and FASTER SPEEDS
...for speedier, lower cost materials handling

● Here's your opportunity to slash lifting and handling costs. Put these new Lodestars to work where their increased speeds and capacity match your maximum requirements. Many thousands already in service demonstrate that you, too, can benefit from more efficient handling, lowered costs and increased productivity.

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CHISHOLM-MOORE HOIST DIVISION
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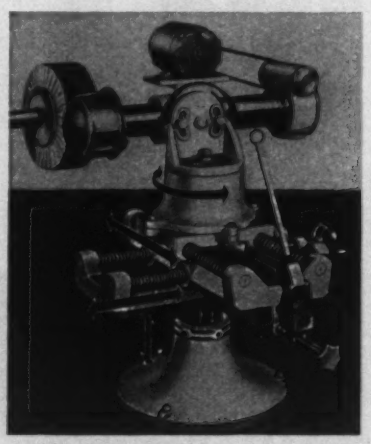
NEW PRODUCTS and equipment

per cubic foot). Materials can be hurled 90 ft and piled 35 ft above the discharge point. Trajectory can be varied from 15 degrees above the horizontal to a 50 degree maximum.

For further information, *write* Dept. PR, Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Buffing, Grinding Unit Handles Different Shapes

PRACTICALLY any buffing or grinding job in the average plant can be done with a machine called the Hand-D-Matic. It's a standard, basic pedestal and spindle unit available with interchangeable components for workpieces of different shapes.



In some cases, one operator can easily service two or more units. The company says production tests show better quality work with less operator fatigue and hazard.

For further information, *write* Murray-Way Corp., P. O. Box 180, Birmingham, Mich.

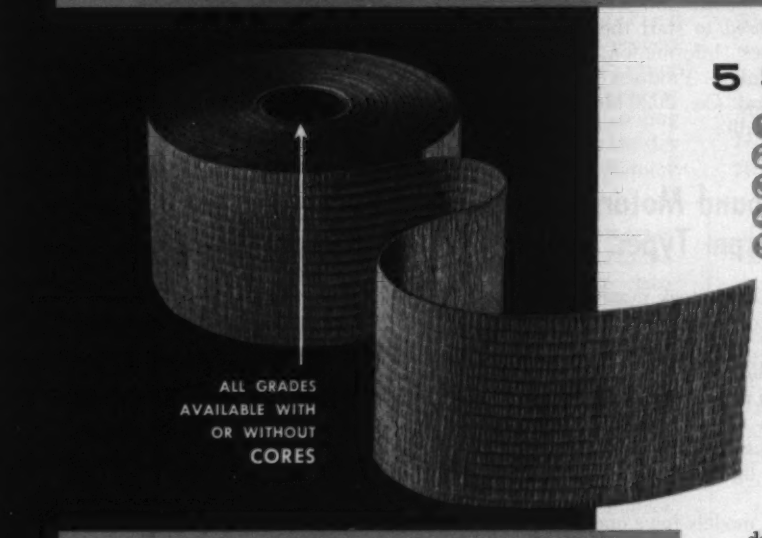
Steam Cleaner Design Is More Efficient

HOT SOLUTION is delivered at a rate of 130 gph by the Malsbary Model 130 steam cleaner. The new nozzle design increases cleaning efficiency 20 per cent over standard 120 gph sizes, the manufacturer claims.

The oil fired, caster mounted

Thilco Protective COIL WRAPS

For Automatic Machine Wrapping of Steel Strapping • Steel, Copper and Alloy Wires • Aluminum Wire and Extrusions • Plastic and Rubber Hose... *and other products*



5 STANDARD GRADES

1. ASPHALT LAMINATED
2. ASPHALT LAMINATED — REINFORCED
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4. BLOND LAMINATED — REINFORCED
5. CREPED KRAFT (Plus Custom Grades)

Featuring Thilco's NEW LONGITUDINAL PLEATING

New, exclusive Thilco LP (Longitudinal Pleating) provides two-way stretch, adds approximately 20% more lineal foot yield to Standard creped grades. This added footage per roll increases machine coil wrapping efficiency by 20% — cuts downtime by reducing the number of roll change-overs, and saves another 20% on storage space. LP increases wrapper flexibility and is especially advantageous for packaging small circumference coils. All Thilco Coil Wraps are available *with* or *without* pleating in standard widths 3" to 5½" or in special widths to order. All can also be trade-mark Print Decorated. Write for details.

NEW CREPED WEIGHTS

Now available in basis weights up to 80 lb./50 lb./60 lb. laminated (50% heavier than previous available weights) or 90 lb. Single-Ply, creped up to 50% stretch.

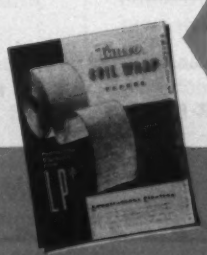
NEW PALLET LOAD "PUT-UP"

Saves Handling Costs — Increases Efficiency by 20%

Thilco Coil Wraps are compactly stacked on pallets, spindled on dowels at corners, interleaved with Thilco heavy-duty Kraft at 4-roll layer intervals to reduce shifting, then wrapped with an abrasion resistant, water-proof Thilco WRAP-DRI paper blanket which produces a sturdy, weather-resistant packaged unit. This new "pallet packing" method reduces handling costs, saves approximately 20% on storage space, provides immediate on-sight inventory and increases efficiency generally. There are many other advantages you'll want to learn about.

THILCO PAPERS INCLUDE:

- **WRAP-DRI** Waterproof protective papers
- **THILCO-TUF** Stainproof laminated papers
- **VAPOTITE** moisture-vapor barrier papers
- **POLY-COATED** and special treated papers
- **MG and MF** natural and colored krafts
- **GLASSINE** and greaseproof papers
- **SPECIAL BAGS** and case liners



Write for Thilco Brochure containing Coil Wrap Samples and complete descriptive information.

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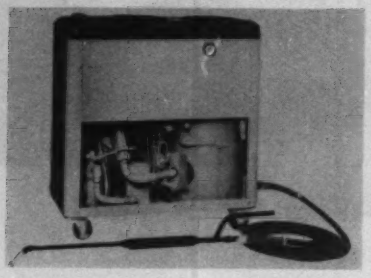

model measures 45 x 43 x 21 in. and weighs 565 lb. A gas fired, stationary model is available.

For further information, *write* Malsbary Mfg. Co., 845-92nd Ave., Oakland 3, Calif.

Shielded Arcwelder Joins Metals to 0.025 in.

A SHIELDED ARC, precision welder (Model VTW-14) can handle ferrous and nonferrous metals (from 0.001 to 0.025 in. thick) on a production basis. It can be used with any inert gas shielded arc-welding head.

It has a continuously adjustable welding current range from 0.25 to 25 amperes. A saturable reactor equipped with high capacity chokes is used to obtain stepless adjustment. The company says dc output is extremely smooth. Several methods can be used to start the arc.

For further information, *write* Vacuum Tube Products Div., Hughes Aircraft Co., 2020 Short St., Oceanside, Calif.

Series Wound Motors Are High-rpm Types

THREE standard stock motors have been added to the Robbins & Myers series wound, universal series. They complete a line of 17 units in the 1/50 to 1 hp range. Characteristics include high operating speed, high starting torque, adaptability to speed control, and light weight per horsepower.

The three models have open continuous ratings of ½ hp at 5000 rpm, ¾ hp at 7500 rpm, and 1 hp

at 10,000 rpm. All are built in frame size 4334 and have pad type bases. Net weight is 13 lb. The units are 8⅞ in. long, 5¾ in. wide, and 5½ in. high.

For further information, *write* Universal Motor Div., Robbins & Myers Inc., Springfield, Ohio.

Variable Speed Pulleys Use Narrow V-Belts

FIVE variable speed pulleys, including adjustable motor bases, V-belts and V-belt sheaves, have been added to the Hi-Lo cam operated line. Economical, narrow V-belts can be used. The pulleys are rated

NOW The Most Accurate-Versatile ROUNDNESS GAGE

Cleveland
INDI-RON* ultra precision Roundness, Concentricity and Squareness Gage.

★ Measures to Three Millionths Accuracy
Roundness—any diameter, I.D. or O.D.
Concentricity—any diameters, I.D. or O.D.
Squareness—any surface to any axis
Flatness—any face or flange

★ Suitable for Laboratory or Production
Simple to operate
Parts easily centered and tilted
Permanent Polar Chart record
Scales—Thousandths, Tenths and Millionths

★ NO MAINTENANCE PROBLEMS
Spindle-sealed—no maintenance
Proven drift free gaging equipment
Protector Tip* equipped gage head

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Ask for a demonstration and see why CLEVELAND Gages give you more.

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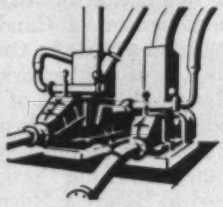
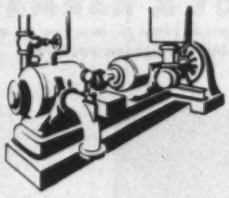
FULLER EQUIPMENT

for the process industries

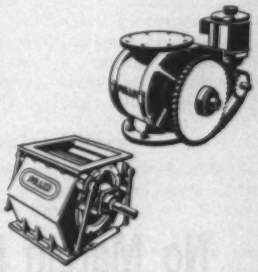


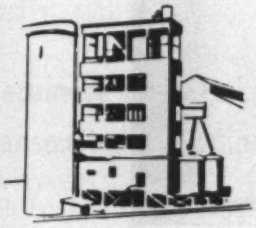
Pneumatic Materials Handling Systems. Widely specified throughout the process industries, Fuller's range of equipment offers best single source for solving problems in moving dry bulk materials pneumatically. Fuller-Kinyon Pumping Systems, Airveyor® Pressure and Vacuum Conveying Systems, and F-H Airslide® Fluidizing Conveyors are completely sealed to prevent both contamination of the product and any leakage of dust, etc., into the surrounding area. They are used to move dry, granular and pulverized materials to and from cars, ships, trailers, storage and processing points.



Fuller Rotary Compressors and Vacuum Pumps are vibration-free, can be installed anywhere, even on balconies. Fewer moving parts mean minimum maintenance. Compressors and Vacuum Pumps handle air and gases from 30 to 3300 cfm at pressures to 125 lb. gage. Vacuums to 29.95 in. (referred to 30-in. barometer).

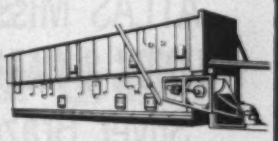
Fuller Vane-type and Roll Feeders . . . for volumetrically controlled feeding of a wide range of dry pulverized or granular materials. Also Fuller Rotary Valves . . . used under silo deck slabs and bins to permit the free flow of pulverized materials which tend to arch, such as lime and cement raw materials.





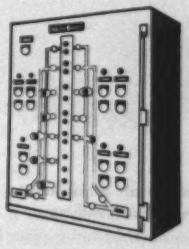
Fuller Preheaters, Humboldt Suspension Type . . . for preheating dry, pulverized Portland cement raw materials with rotary kiln waste gases.

Fuller Horizontal and Inclined Grate Coolers are compact, easily installed for fast, efficient cooling of materials such as nodulized phosphate rock, pebble lime, ores, dolomite, iron nodules and Portland cement clinker from 2800°F. or higher to any desired point within a reasonable range of atmospheric temperature.



Fuller-Material-Level Indicators signal audibly and visibly when materials reach a predetermined high or low level. Controls conveyor motors, valve circuits, etc.

Fuller Control Panels permit automatic, remote, one-man control of multiple operations. Easily-read panel permits visualizing flow of material to storage or from process bins.



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In lines made to specifications by Flexonics Corporation, Maywood, Illinois, silver brazing joins a corrugated flexible pressure carrier, a braid sleeve and a coupling nipple—all of stainless steel; it permits joining all of these elements of the assembly without danger of annealing the pressure-carrying flex or the restraining braid as welding might do.

Assemblies designed for 6,000 psi operating pressure are required to withstand a 12,000 psi test and take four times their normal operating pressure before failure. They may also be required to pass a flame test in order to meet specifications.

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Assemblies in ATLAS Missile **HANDY & HARMAN** Silver Brazed

'Intercontinental Atlas missile being made ready for launching.

Close-ups of missile section, showing silver alloy brazed ducting assembly.

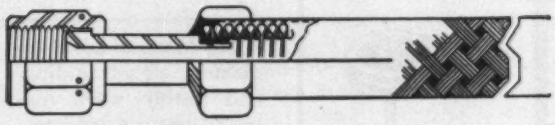
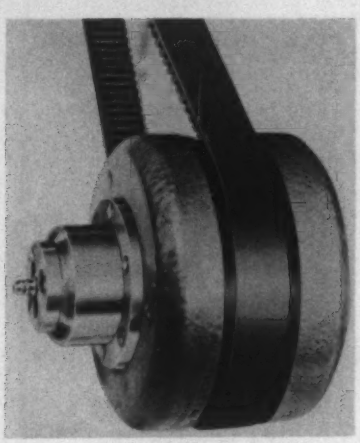


Diagram of pressure carrier.

FOR A GOOD START: BULLETIN 20.

This informative booklet gives a good picture of silver brazing and its benefits...includes details on alloys, heating methods, joint design and production techniques. Write for your copy.



for 1, 1½, 2, 3, and 5 hp motors at 1750 rpm and for ¾ to 3¼ hp motors at 1150 rpm.

The cam and cam follower assembly behind each pulley face provides constant speed even when overloaded. Elimination of springs as driving members avoids belt compression. Automatic belt tensioning and constant belt alignment are used.

For further information, *write* Lovejoy Flexible Coupling Co., 4875HW Lake St., Chicago 44, Ill.

Machinery Mounts Lower Transmitted Vibration

MACHINES having leveling screws built into the feet or at load bearing points can easily be set on Model UL Level-Rite mounts. The units combine Unisorb vibration control pads with a cast steel base plate. The external leveling screw fits into the recessed center.

The company says the unit reduces transmitted vibration up to 85 per cent, protects against induced vibration, cuts noise levels, and allows high machine speeds.

Machine can be moved whenever required.

Sizes are available from 4⅝ to 10⅝ in. square. You can get load ratings up to 7500 lb. A superdensity Unisorb is available for lathe mountings and long bed machinery with central drives.

For further information, *write* Unisorb Div., Felters Co., 210 South St., Boston 11, Mass.

NEW Literature

Write directly to the company for a copy

Oriented Electrical Steels

A 60 page booklet discusses oriented electrical steels and contains charts describing their electrical and magnetic properties, processing of the materials, and physical properties. Armco Div., Armco Steel Corp., 4159 Curtis St., Middletown, Ohio.

Steel and Aluminum Data

A pocket guide on steel and aluminum gives types available, sizes carried in stock, weight and application data, chemical analyses, and mechanical properties. Joseph T. Ryerson & Son Inc., P. O. Box 8000-A, Chicago 80, Ill.

Dust Collectors

Bulletin 1828, 16 pages, describes a series of dust collectors and lists typical applications. Industrial Div., American Radiator & Standard Sanitary Corp., Detroit 32, Mich.

Welding Data

Operating data for the Dual Shield carbon dioxide welding process are contained in a brochure, NH-636. Automatic welding data for buttweld, horizontal and positioned fillet, and spotwelding data for V-groove flat joints on mild steel are given. National Cylinder Gas Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

Heat Treating Equipment

Bulletin B-91 covers continuous plate and bar heat treating installations. Drever Co., Red Lion Road & Philmont Avenue, Bethayres, Pa.

Plating Time Calculator

You can easily determine the plating time required to obtain any desired thickness at any current density with the Enthone plating time calculator. Enthone Inc., 442 Elm St., New Haven, Conn.

Aluminum Pig and Ingot

A brochure includes information on which alloy to use for different methods of casting, mechanical properties of typical alloys, alloy composition limits, and common uses of castings made from various alloys. Aluminum Co. of America, 726 Alcoa Bldg., Pittsburgh 19, Pa.

Commercial Filters

"Complete Filtration for Liquids and Gases," 8 pages, describes each of the products in the CFC line of filtration equipment. Information is classified according to applications, operation pressures, and sizes. Commercial Filters Corp, 2 Main St., Melrose, Mass.

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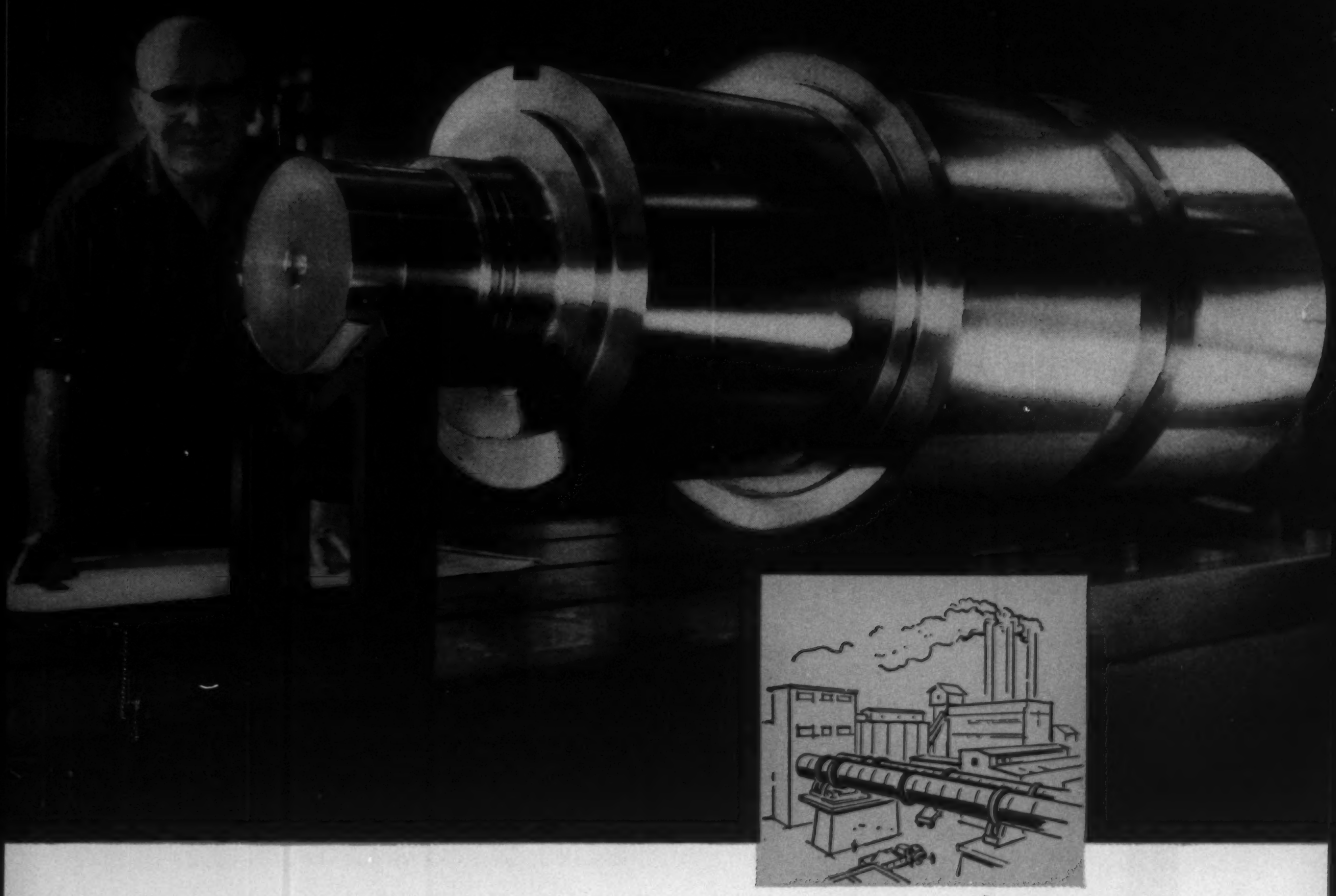
INLAND

Back of a Sack of Cement... This 4½ Ton Steel Forging



Give a thought to this the next time you drive a concrete highway or see a concrete block building. Only 8900 pounds of what it takes to make a sack of cement . . . a relatively small forged steel pinion shaft to drive cement mill machinery.

The large diameter is only 32 inches and the length only 8 feet—but it's a tough, dependable component of a vast manufacturing complex—the cement mill.

The smooth, bright finish is comparable to the gleaming surface of a 60 ton turbine rotor. Why? . . . Because the same careful metallurgical control, skillful engineering and precision production accorded the largest forgings we make are characteristic of this relatively small steel forging.

Place with us your simplest or most intricate forged steel components of any size or shape—you will like the results you get.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

Record Output Seen for Quarter

THE FIRST quarter will be the best in the steel industry's history from the standpoint of ingot production and finished product shipments.

Steelmakers will produce about 34.7 million ingot tons, nearly 1 million more than they poured during last year's strike threatened second quarter. Shipments will reach an all-time high of 25 million tons, far surpassing the 23.3 million shipped in the first quarter of 1956.

In spite of reduced demand and clear indications that shipments are outstripping new orders, last week's operations continued at a high level. Steelmakers operated their furnaces at 92.9 per cent of capacity (vs. 92.8 in the previous week) and poured about 2,647,000 ingot tons.

BIG DROP UNLIKELY—Don't expect steelmaking operations to drop more than 10 or 12 points during the second quarter. Individual mills, particularly those specializing in wire and tubular products, may experience greater setbacks, but the national ingot rate will average 80 to 85 per cent for the period. Reasons: 1. The eight largest steel producers have 76 per cent of the industry's capacity. Because they have a wide range of products, they can meet weakness in one market by channeling their ingots into items for which demand remains strong. 2. Even if demand eases, steelmakers will keep melting operations at a fairly high level until they have rebuilt their inventories of semifinished material.

SHEETS STILL BOOMING—Despite cutbacks from some of their biggest customers, cold rolled sheet producers are confident of near capacity operations through June. They're having no trouble selling the steel that automakers and appliance manufacturers don't want. In most cases, the canceled or deferred tonnage has no immediate impact on mill operations because it comes out of the "overbook." Sheet producers tried to anticipate automotive cutbacks by booking all the business they could get from customers in other industries—even when that meant booking beyond capacity. Now, some mills are actually thankful that their automotive customers plan to curtail production by 15 to 20 per cent. As one sales executive puts it: "If we don't get some auto cutbacks, we're going to be mighty embarrassed."

SIGNS OF STRENGTH—In the Pittsburgh area, producers of cold rolled and galvanized sheets say they can sell all the "excess primes" they can generate. Consumers will pay first-class prices for overruns and cut lengths from coils with damaged edges. If demand were as weak as some observers have painted it, such material would have to be sold in the secondary market. In Chicago, some steel users apparently believe that they were too pessimistic about business prospects. With inventories at low ebb, they're asking the mills to ship extra tonnage or reinstate original orders.

STAINLESS REAPPRAISED—Early in the year, market analysts were guessing that 1960 shipments of stainless and heat resisting steels would reach an all-time high of 820,000 tons. Now they're less bullish. Reasons: 1. Consumer inventories didn't get as low as they figured and probably won't be rebuilt to the extent that was expected. (Throughout the strike, stainless producers with 30 per cent of the industry's capacity were melting and shipping steel.) 2. New car sales aren't up to expectations. Reappraising the outlook, the analysts subtract 50,000 tons for inventory miscalculation and 25,000 tons for automotive exuberance. That leaves 745,000 tons—still enough to beat the record (688,000 in 1956) with plenty to spare.

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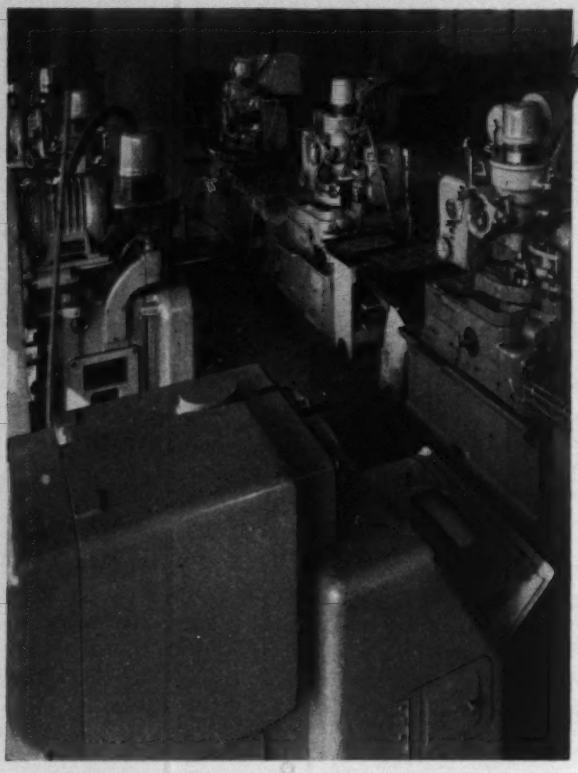
*Current prices were published in the Mar. 7 issue and will appear in subsequent issues.

FELLOWS GEAR PRODUCTION EQUIPMENT

Builds Extra Quality at Lower Cost for STANLEY



View of production floor at Stanley Electric Tools, showing some of the Fellows Gear Production Equipment used.

Stanley is a name you know . . . a name that stands for high quality in electric tools.

To insure this quality, while providing the high production rates that mean lower costs, Stanley Electric Tools, Division of The Stanley Works at New Britain, Conn., uses Fellows Gear Production Equipment for shaping, shaving and inspecting the armature pinions for its electric tools.

Fellows has long been the leader in Gear Production Equipment, with machines for every gear production job: Fellows Gear Shapers, Pfauter Gear Hobbers, Fellows-Reishauer Gear Grinding Machines, Fellows Gear Shaving Machines and Fellows Inspection Instruments.

If you make gears of any size, from 1/16″ P.D. to 120″ P.D., Fellows' 60 years of experience can help you improve quality and cut costs. For complete information on Fellows Gear Production Equipment, call your nearest Fellows office.

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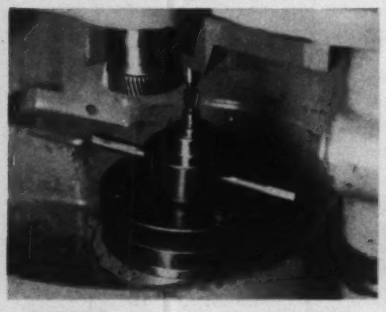
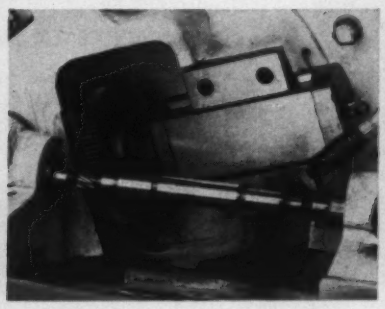
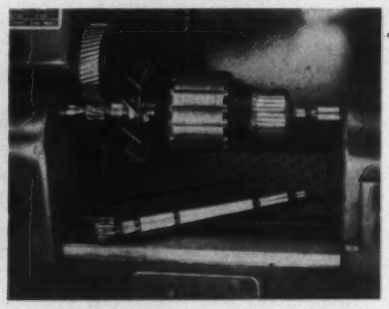


SHAPING. The versatile No. 7125 Fellows Gear Shaper gives Stanley high production speeds (up to 450 strokes per minute). It also provides fast, simple changeover from one job to another.

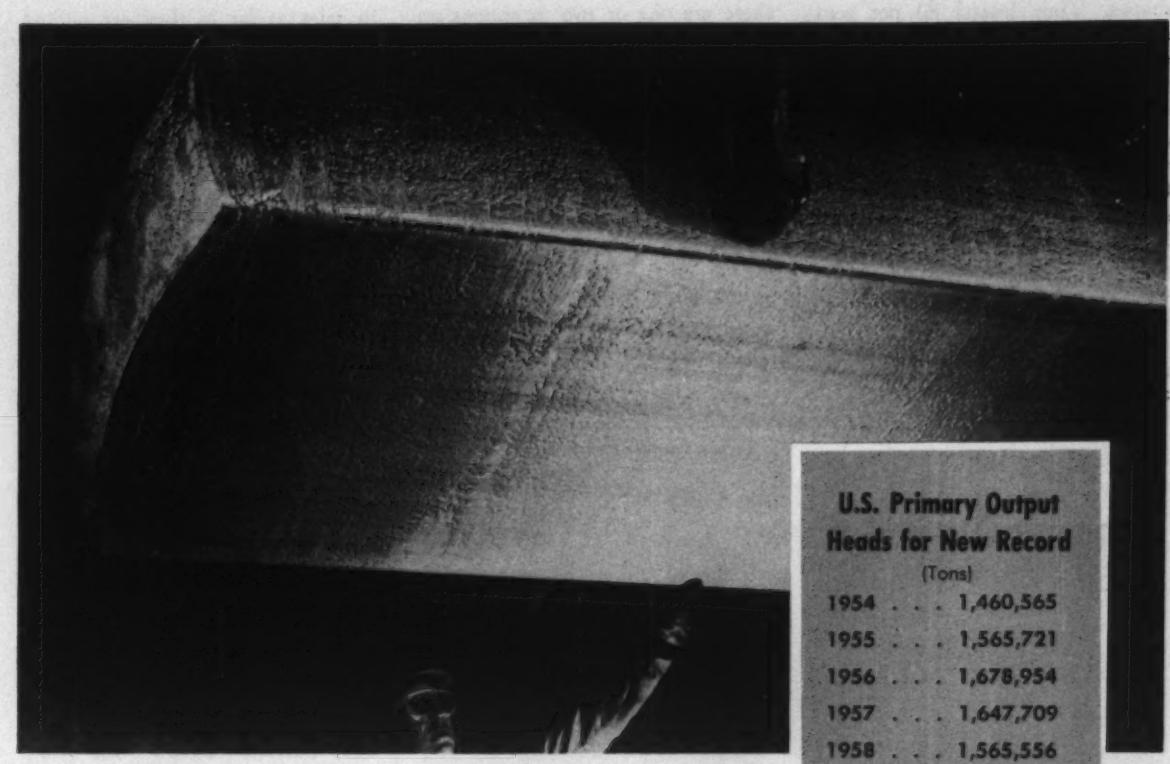


SHAVING. The No. 4 Fellows Fine Pitch Shaving Machine puts finishing touches on each pinion and adds the finish which results in long life and quiet operation.



INSPECTING. The No. 4 Fellows Fine Pitch Red Liner makes and records a composite check of gear accuracy, insuring high quality standards.

THE PRECISION LINE **Fellows** *Gear Production Equipment*



U.S. Primary Output Heads for New Record

(Tons)

1954	1,460,565
1955	1,565,721
1956	1,678,954
1957	1,647,709
1958	1,565,556
1959	1,953,019
1960	2,100,000*

Source: Aluminum Association.
*Estimated by STEEL.

New Records Sure if Aluminum Keeps Pace

Availability will be the highest ever as primary output, smelter production and imports all increase. Sales should rise 10 to 15 per cent. Prices are stable

FOR THE SECOND straight year, the U. S. aluminum industry is set to shatter all previous sales and production records. Despite a slow start, nothing is on the horizon to keep the industry from achieving 8 per cent higher production and 10 to 15 per cent greater sales forecast for 1960. Things look as bright to users as to producers. There's more than enough aluminum available to fill demand. And consumers will be able to buy metal throughout the year at prices close to current quotations. They might even pay a little less for certain products.

• **Potlines to Hum**—Currently, primary producers are turning out metal at an annual rate of 1,955,500 tons (STEEL estimate). That is slightly under the record shattering rates of 1959's second, third, and fourth quarters. Total production in 1959, however, came to 1,953,019 tons.

Production should start climbing this month. For the year, primary output should total around 2.1 million tons.

• **Smelters Up Too**—The secondary aluminum industry is set to have a banner year also. Higher demand, paced by heavier requirements for castings by the auto and appliance industries, should cause production to jump to between 500,000 and 530,000 tons compared with 466,000 tons last year.

• **More Imports**—Pig and ingot imports, which dipped a little in 1959 to around 240,000 tons, should bounce back. Look for between 275,000 and 325,000 tons of foreign primary metal to find their way into the U. S. this year. About 200,000 tons will come from Canada and the balance mainly from Western European nations (which virtually doubled shipments to the U. S. between 1958 and 1959).

• **Plenty of Aluminum**—Take the sum of primary production, smelter output, and imports, and you come up with an all-time high for total domestic availability between 2,925,000 tons and 3,005,000 tons. Add to that total the growing tonnages being imported as semifabricated

shapes. They leaped 80 per cent in 1959 to about 55,000 tons, and are sure to go up again this year.

• **Shaken but Confident**—It's axiomatic that production records don't mean much without corresponding increases in sales. And let's face it—although the hard market facts of 1960 haven't caused aluminum producers to lose their optimism, things haven't lived up to expectations so far.

The industry pretty universally reports sales are running at about the same level as in 1959, though there are one or two exceptions on the plus side. That isn't bad! Shipments in 1959 leaped an amazing 39 per cent to 2,477,150 tons.

No one expects a spurt this year similar to that in 1959. But on the basis of anticipated increases in usage by major customers, plus the growth of new markets, the consensus is a sales upswing of 10 to 15 per cent. Translated into tons, that would mean shipments of 2.72 million to 2.84 million tons.

• **Where Growth Will Come**—Producers foresee a continuing increase in sales as far as they are willing to prognosticate. And they are pretty much agreed as to which markets have the best potential: L. P. Favorite, vice president, Aluminum Co. of America, lists autos, home building, and electrical uses. Derek Richardson, vice president-aluminum sales, Metals Div., Olin Mathieson Chemical Corp., thinks the future looks bright in building products, particularly in industrial and residential siding; in the transportation and consumer durable goods fields; and in containers, especially those used for dry goods.

Defense uses, the entire packaging area, and scores of miscellaneous applications will also widen aluminum's horizons.

Reynolds Metals Co. plans to intensify work on industrial machinery and material handling equipment such as cranes, hoists, tote boxes, bulk handling systems, beds for presses, chucks, and textile machinery.

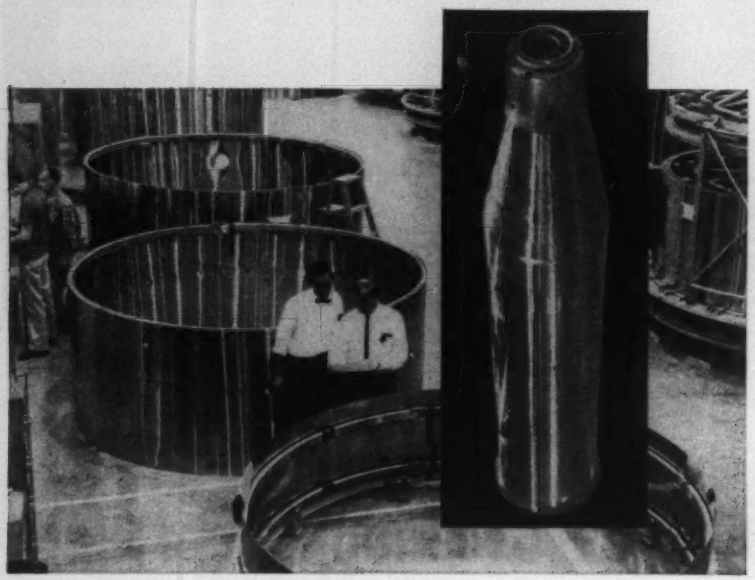
Mr. Richardson sums up the general industry feeling this way: "Aluminum will grow in the markets in which it is best suited for use where weight savings, corrosion resistance, and the other advantages of aluminum are important."

• **Still Ample Capacity** — Even if consumption over the next few years should match the most bullish forecasts, you don't have to worry about a shortage. Here's why: U. S. primary producers entered 1960 with a capacity of 2,335,750 tons. That has already grown to 2,402,750 tons and will stand at 2,444,750 tons by the end of the year. Another 160,000 tons is under construction in this country.

In addition, Aluminum Co. of Canada has 770,000 tons of capacity and an additional 90,000 tons of partially installed capacity that could be brought in on short notice. The other Canadian producer, Canadian British Aluminium Co. Ltd., has 90,000 tons of installed capacity.

And producers aren't inclined to allow themselves to be caught in a pinched supply situation. You can expect to hear plans in the near future about further expansion.

Mill capacity seems to be ample for the present though there may be some expansion before too long. Reynolds, for example, says it might



"the life of an ATLAS tank section begins in the town of Washington, Pa.

. . . where the Washington Steel Corporation produces thin-gauge Stainless Steel in long, flexible bands about a yard wide."*

Washington Steel Corporation is the exclusive supplier of stainless skin for the ATLAS program for a very good reason: it has been able to meet the exacting specifications laid down for this specific undertaking.

Washington Steel Corporation is the pioneer in precision-rolling of light gauge stainless sheets by the Sendzimir process.

*ATLAS—The Story of a Missile
by John L. Chapman, ©1960

WASHINGTON STEEL CORPORATION
3-0 WOODLAND AVENUE WASHINGTON, PA.

want to enlarge facilities for extrusions, tubing, conduit, and electrical conductor cable. Producers name those products, as well as sheets and plates, as having particularly bright prospects.

• **Eying Other Lands**—You probably haven't heard much about it but the domestic industry is making a big pitch for the foreign market. Three of the six major producers (Alcoa, Reynolds, and Kaiser) already have heavy investments overseas in the form of wholly owned subsidiaries and affiliates. A fourth (Olin Mathieson) is participating in a joint undertaking in Africa. The trend seems to be for domestic companies to buy part ownership in a foreign producer or fabricator, leaving control in the hands of nationals of that nation.

D. A. Rhoades, Kaiser Aluminum's president, cites the overseas potential this way: U. S. per capita consumption in 1959 was 27 lb. That compared with: United Kingdom, 9.2 lb; European Common Market, 6 lb; balance of Free Europe, 3.6 lb; Latin America, 0.8 lb; rest of Free World, 0.4 lb.

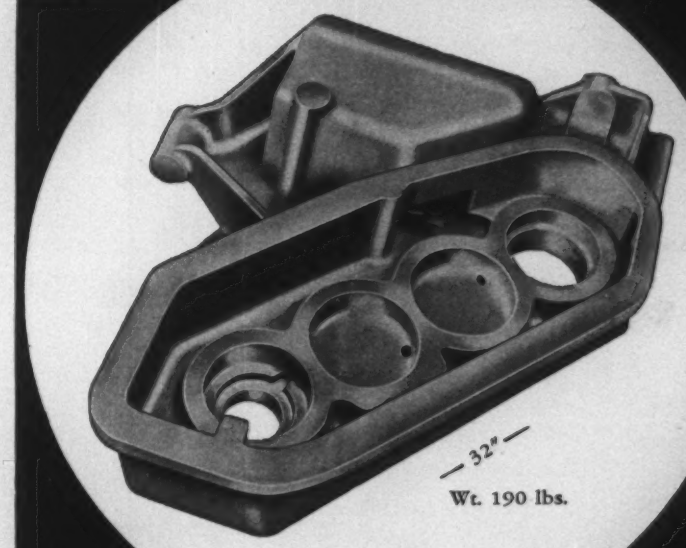
Foreign markets also mean an outlet for surplus U. S. production. Last year, domestic companies shipped 121,100 tons of crude metal to other nations, double the 1958 figure.

• **What Prices Will Do**—Forecasting price actions in aluminum is becoming more complex. Some metalmen, for example, think the next price movement will be on the world market rather than a unilateral hike by U. S. producers.

The key may be what price aluminum producers think it will take to open up another big market or a segment of it. It's no secret that producers would like to see another price bump. Right now, though, the competitive situation probably rules one out. Most likely: A modest hike in the fourth quarter of this year.

Actually, it's entirely possible the bulk of the price action will be on the downward side. Producers lowered quotations recently in specific product lines like building sheets and high-silicon alloy pigs. You can expect further steps along this line as the industry intensifies its efforts to win large tonnage markets for standard products.

URICK'S URITE GRAY IRON



Courtesy Euclid Division General Motors, Cleveland

GEARED TO THE JOB

URICK Foundry's integrated sales and engineering departments are geared directly to the production department —all working together to supply high quality gray iron castings with dimensional stability, uniform density, and high machinability.

From the planning stage, all the way to the finished part, URITE gray iron castings are designed and engineered to deliver greater tensile strength in relation to the service required, and in many cases with less weight. URITE gray iron is better because it is cast with fine flake graphite uniformly distributed throughout the iron matrix.

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MANUFACTURING CO., INC.

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Filters / Evaporators / Process Equipment / Contract Manufacturing including Heavy Castings

Wire . . .

Wire Prices, Pages 146 & 147

Wire demand has been set back by the downward revision in automotive industry schedules. While there have been few order cancellations, shipment deferments extend deliveries over a longer period. Aside from the auto industry, there is also a slackening in demand from the furniture industry.

Construction mesh demand is dormant, but a spring pickup is anticipated. Road lettings are starting; they will generate bar and mesh demand.

Merchant wire volume is also expected to pick up seasonally, but sharp competition from imported material is continuing.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 145 & 146

Despite recent loosening in rolling schedules, sheetmakers anticipate an active first half. Most mills have little hot and cold rolled tonnage to offer for delivery before mid-May, and it's expected fewer cancellations and order cutbacks will be experienced from here on. Generally, it's felt that as time passes new orders will be sufficient to keep operations at a high level at least through June.

Chicago district producers say they are shipping tonnage much faster than they are getting in new business. Still, their order books for April are practically full, and they don't look too bad for May. Deferments have been heavier than order cancellations, and the setbacks have been more apparent in May and June schedules than in April's.

Some of the deferments are explained by sluggish sales in consumers' goods, such as automobiles and appliances. Some buyers seem to have geared their purchases of steel to use levels higher than they were able to reach. Some users may have cut their orders too much in the last couple weeks, and may find it necessary to reorder before the second quarter is far along.

There are no setbacks in galvanized sheets or tin plate. Both products will continue to be produced at capacity for months to come. However, the mills are offering a little more tonnage of coated sheets for

late May and June shipment. Electrical sheets and enameling stock are in a little easier supply, partially reflecting a softening of demand from appliance manufacturers.

Stainless sheets and strip are in easiest supply of all the flat rolled specialties; deliveries are running around seven weeks.

Most sheetmakers will accept orders for third quarter shipment, but there is little buying interest being shown in that position.

Tubular Goods . . .

Tubular Goods Prices, Page 148

Producers of tubular goods anticipate a substantial seasonal increase in orders as spring building activities pick up momentum. One Midwestern producer of buttweld pipe is operating close to capacity and is now booking business into May.

Rotary oil drilling resumed a declining course in the week ended Feb. 29. The rig count dropped 23 units from the preceding week to 1660, 200 rigs below the number operating a year ago. Unfavorable weather and bad roads in some areas contributed to the sluggishness.

Continental-Emsco Co. has been awarded a defense contract which will "take up some of the slack" of its oil equipment manufacturing plant at Houston. The plant will begin producing ground handling facilities for the federal missile program. Youngstown Sheet & Tube Co. is the parent company.

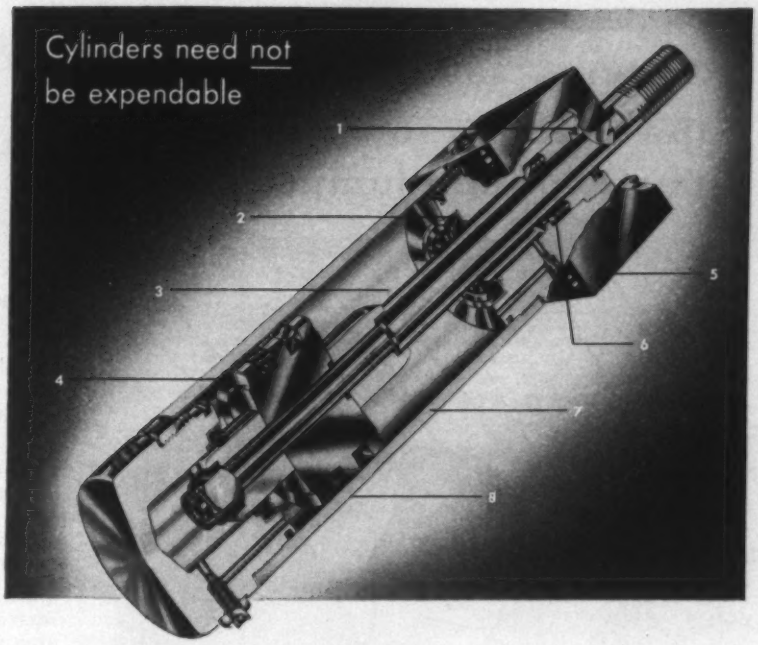
Plates . . .

Plate Prices, Page 144

Sheared plates are in easy supply. Some mills can offer deliveries in three to four weeks on certain sizes and less than six weeks on others. Still other mills are quoting a little beyond—around late April and early May. Alloy plates and clad plates can be had for late April shipment.

Continued dullness in plates reflects a particular lack of demand from shipyards, fabricators of large diameter pipe, and bulk storage tanks. Specifications for domestic fuel oil tanks are seasonally slack, but demand for small tanks is reported picking up in New England.

But some improvement is noted in railroad requirements. The Norfolk & Western has started placing



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2. NEW "SUPER" CUSHION for air or METALLIC SELF-ALIGNING MASTER CUSHION for oil.
3. HARD CHROME PLATED CYLINDER BORES AND PISTON RODS for greater protection and reduced wear.
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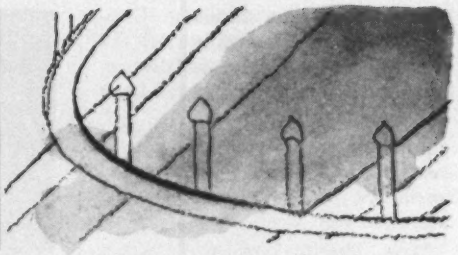

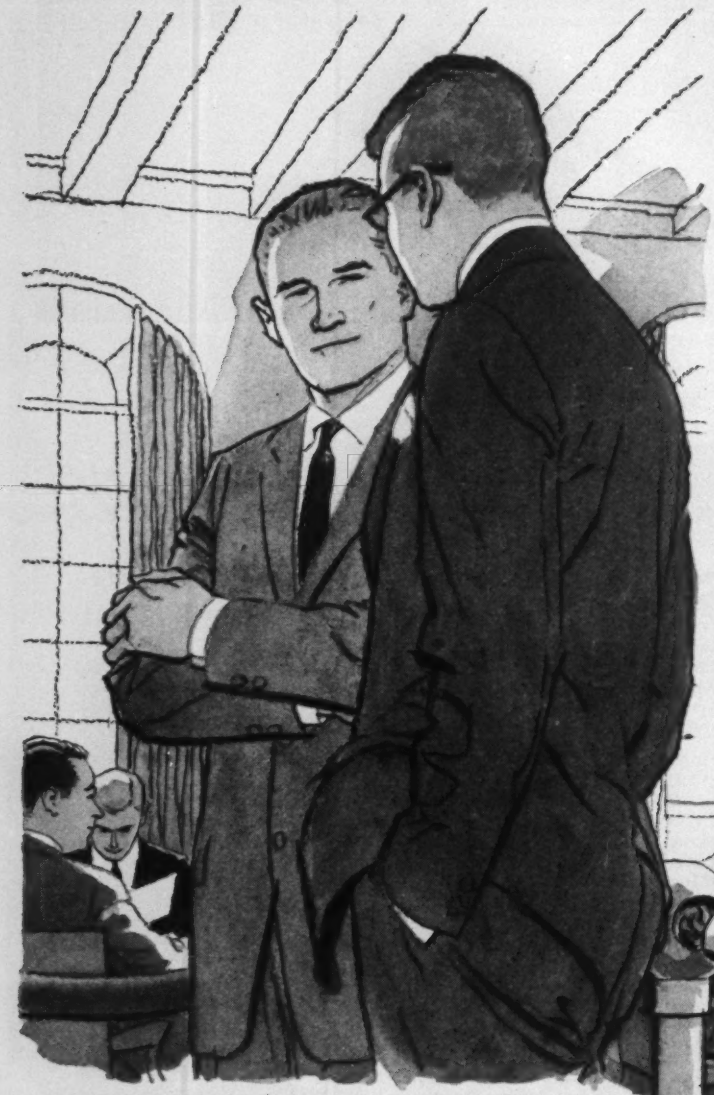

In our company we've made the Payroll Savings Plan available for some time. I thought, naturally, that we had a large participation. But when I checked up a few weeks ago I discovered that only about 22% of our people were making use of the Plan. It's so easy to say, "Sure, this is a fine idea, and I'll sign up next payday."

What our people needed was someone to explain this convenient savings plan *in person;* someone to show them that just signing the card would put this fine thrift program into automatic operation. They needed somebody to invite them to *start right now.*

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Perhaps *your* organization, too, has a large percentage of employees who have *never been invited* to combine patriotism with basic thrift through the Payroll Savings Plan. Companies with high employee participation are enthusiastic about its benefits in terms of lower employee turnover, better safety records, and the satisfaction engendered by helping large numbers to contribute to our Nation's Peace Power. The greater your employee participation, the more substantial your company benefits will be. Contact your State Savings Bonds Director for prompt, practical help in spreading Payroll Savings information, *person-to-person.*

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STEEL
The Metalworking Weekly

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orders against 32,500 tons of steel (largely plates) required for 1000 hoppercars to be built in its own shops at Roanoke, Va., starting Aug. 1.

Plate specialties are moving fairly well for processing equipment for the chemical and oil industries.

Structural Shapes . . .

Structural Shape Prices, Page 144

Improved structural steel inquiry is particularly noticeable in public work, and an early stepup in awards is anticipated. Demand for heavy structurals is reported holding up well at Chicago, but the lighter sections are less active. Area fabricators think market activity will pick up as spring approaches.

Most fabricated steel promised for spring and early summer delivery will be shipped on time. Virtually all the ground lost during the steel strike has been made up. Contributing to the return of normal fabricating schedules is the rapid buildup of plain material inventories. Standard structurals are reported available in early April, and wide flange shapes a little later that month.

More bridge volume is being estimated in New England, where fabricators' efforts to nudge prices are hampered by keen competition.

Awards involving 94,000 tons of steel for the Narrows Bridge, New York, are outstanding. The structure will be built by the Triboro Bridge & Tunnel Authority. Of the steel placed, Bethlehem Steel Co., Bethlehem, Pa., booked 26,500 tons for one of two towers, while Harris Structural Steel Co., New York, booked the same amount for the second tower. U. S. Steel Corp. has been awarded 41,000 tons of cables and suspender rope.

Bids on the 66,000 tons required for the suspended structure of the bridge will be taken in about a year.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

94,000 tons, for Narrows bridge being constructed by the Triboro Bridge & Tunnel Authority, New York, awarded as follows: 26,500 tons for one of two towers to Bethlehem Steel Co., and 26,500 tons to Harris Structural Steel Co., New York, for the second; 41,000 tons of cables and suspenders to U. S. Steel Corp., Pittsburgh. Bids on 66,000 tons for the suspended structure of the bridge will be asked in about a year.

1800 tons, Washington State, Biggs Rapids bridge, Columbia River, to Pacific Coast Div., Bethlehem Steel Co., Seattle (pending sale of bonds); Paul Jarvis Inc., Seattle, general contractor, awarded at $2,409,163.

1450 tons, Montana State, 1126 ft railroad overpass at Great Falls, Mont., to Pacific Coast Div., Bethlehem Steel Co., Seattle; general contract held by Robertson & Cave and Sletten Construction Co., Great Falls, joint low at $1,138,688.

1427 tons, section of the State Cross Bronx Expressway, FICBE 60-1, New York, through Johnson Drake & Piper, general contractor, to Harris Structural Steel Co., New York.

400 tons, student union building, Illinois Institute of Technology, Chicago, to Vierling Steel Works, Chicago.

202 tons, medium and high tensile, Navy Purchasing Office, Washington, to Isaacson Iron Works, Seattle.

200 tons, also 60 tons of reinforcing bars, buildings and utilities, military installation, Clear, Alaska; general contract by U. S. Engineer to M. B. Contracting Co., Seattle, furnishing materials.

150 tons, sawmill, Simpson Logging Co., Shelton, Wash., to Pacific Coast Div., Bethlehem Steel Co., Seattle.

115 tons, transmission towers, Hanford Works, for Kaiser Engineers, to American Bridge Div., U. S. Steel Corp., Portland, Oreg.

STRUCTURAL STEEL PENDING

4800 tons, state bridgework, LR 70-2, Allegheny County, Pennsylvania; bids Mar. 24.

1840 tons, state bridgework, LR 799-4, Cumberland County, Pennsylvania; bids Mar. 24.

1725 tons, state bridgework, LR 187-11, Allegheny County, Pennsylvania; bids Mar. 24.

1520 tons, state bridgework, LR 187-12, Allegheny County, Pennsylvania; bids Mar. 25.

970 tons, state bridgework, LR 790-2A, Lackawanna County, Pennsylvania; bids Mar. 24.

625 tons, state bridgework, Lackawanna County, Pennsylvania; bids Mar. 25.

350 tons, addition to Portland State College, Portland, Oreg.; Contractors Inc., Portland, low at $858,211 base, to State Board of Higher Education.

342 tons, state bridgework, R208, Bergen and Passaic Counties, New Jersey; Hawthorne Div. Samuel Braen Sons, Hawthorne, N. J., low on the general contract; alternate bids were taken on rolled steel and welded plate, with bids on the former lowest.

150 tons, Booth Memorial Hospital, Salvation Army, Philadelphia; bids Mar. 18.

150 tons, three I-beam bridges, Naknek area, Alaska; S. S. Mullen Inc., Seattle, low at $331,783 to the Bureau of Public Works, Juneau, Alaska.

120 tons, Forest Avenue bridge, Orono, Maine; bids Mar. 23, Augusta, Maine.

Unstated, gate houses and storage buildings at three missile bases; bids to U. S. Engineer, Walla Walla, Wash., Apr. 7.

Unstated, steel frame structures and towers at King Salmon and Cold Bay, Alaska; bids to Federal Aviation Agency, Anchorage, Alaska, Mar. 24 and 25.

Unstated, steel frame calibration building, Glasgow (Mont.) Air Base; bids to U. S. Engineer, Seattle, Apr. 13.

REINFORCING BARS . . .

REINFORCING BARS PENDING

500 tons, Scottish Rite Temple, Seattle; bids in.

400 tons, Sears, Roebuck & Co. building, Spokane, Wash.; bids in.

300 tons, Hills Creek powerhouse, Oregon; also other steel items and tanks; bids to U. S. Engineer, Portland, Oreg., May 10; also 60 ton bridge crane.

260 tons, including structurals and piles, state highway bridge, Madison-Clinton, Conn.; Raymond Construction Corp., Hartford, Conn., low on the general contract.

215 tons, widening three state highway bridges, Lynnfield-Wakefield, Mass.

150 tons, state highway bridges (three), Old Lyme, Conn.; Zaist Bros., Chesterfield, Conn., low on the general contract; also, 415 tons of fabricated structural steel, and 235 tons of steel piles.

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Unstated, 1380 ft concrete apron for proposed super deep sea terminal; bids to Port of Seattle Mar. 22.

Unstated, two dormitories, Western Washington College of Education, Bellingham, Wash.; bids Mar. 29.

Unstated (shapes also involved), Oregon highway bids; Jackson County, three concrete structures, Roy L. Howard Sons Co., Salem, Oreg., low at $725,392; Multnomah County, Corbett St. underpass, Gibbons & Reed Co. Portland, Oreg., low at $313,815; awards scheduled Mar. 10.

Unstated, 4000 ft sewer tunnel, alternatives for plate liner; Lord Bros. Construction Co., Portland, Oreg., low at $623,032 plate liner; alternative $722,748 for concrete liner.

PLATES . . .

PLATES PLACED

420 tons, including 240 tons of medium tensile, and 180 tons of high tensile, Navy Purchasing Office, Washington, to Kaiser Steel Corp., New York.

375 tons, carbon, General Stores Supply Office, Navy, Philadelphia, to Plastoid Corp., Hamburg, N. J.; 230 tons, steel strapping, to Signode Steel Strapping Co., Chicago.

375 tons, carbon, General Stores Supply Office, Navy, to Harrisburg Steel Corp., Harrisburg, Pa.; 180 tons, steel strapping, to Stanley Works, New Britain, Conn.

227 tons, General Stores Supply Office, Navy, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.; 348 tons, steel sheets, awarded same producer.

Unstated, steel bulkhead, McNary Pool wharf; Triangle Construction Co., low at $100,671 to Umatilla, Oreg., Port Commission; piling, wales, and rods to be port furnished.

PLATES PENDING

100 tons or more, steel dredge pipeline pontoons; Commercial Steel Fabricators, Seattle, low at $78,880 for 16 units; $97,100 for 20, to U. S. Engineer, Portland, Oreg.

PIPE . . .

CAST IRON PIPE PLACED

392 tons, 4 and 12 in. for Tacoma, Wash., to U. S. Pipe & Foundry Co., Seattle.

CAST IRON PIPE PENDING

517 tons, 3 to 10 in., King County District No. 49, Seattle; bids in.

409 tons, 4 to 8 in.; bids in to Chelan, Wash.

334 tons, 4 to 16 in.; bids in to Tacoma, Wash.

166 tons, 4 to 8 in.; bids in to Seattle.

Unstated, 20, 24, and 30 in.; bids to Port Angeles, Wash., Mar. 15.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Canadian Pacific, 45 locomotives with twenty-five 1200 hp diesel electric units going to General Motors Diesel Ltd., London, Ont., fifteen 1000-hp diesel electric road switchers to Montreal Locomotive Works, Montreal, Que., and five 44-ton diesel hydraulic locomotives to Canadian Locomotive Works.

RAILROAD CARS PLACED

Norfolk & Western, 1000 eighty-five ton roller bearing hoppercars, to own shops at Roanoke, Va. Equipment will require 32,500 tons of steel. Construction is expected to begin about Aug. 1.

Union Pacific, 1350 freight cars, 25 baggage cars, and 20 coaches, with 500 boxcars and 300 seventy-ton flatcars going to its own shops; 150 covered hoppercars and 200 gondolas to Pullman-Standard Div., Pullman Inc., Chicago; and 200 gondolas with Gunderson Bros. Engineering Corp., Portland, Oreg.; the baggage cars will be built by ACF Industries, New York, and the coaches by Budd Co., Philadelphia.

Canadian Pacific, 500 fifty-ton boxcars, to Canadian Car & Foundry Co., Montreal, Que., and 100 forty-six ft piggyback flatcars to National Steel Car Corp. Ltd., Hamilton, Ont.; boxcars are in addition to 500 recently noted as placed with the National Steel Car Corp.

Shipments of Steel Products—December, 1959

(Net tons; all grades)

Products	Carbon	Alloy	Stainless	Total 12 Months 1959	Total 12 Months 1958
Ingots	50,472	13,534	2,518	334,918	267,422
Blooms, etc.	170,716	50,595	2,015	1,498,620	1,142,116
Tube rounds	618	551	.....	14,669	10,699
Skelp	1,996	.....	.....	41,209	113,546
Wire rods	118,515	3,172	1,606	980,266	894,936
Shapes (heavy)	518,220	7,717	7	4,090,535	3,964,608
Steel piling	44,480	.....	.....	340,669	439,972
Plates	694,140	54,904	4,606	5,819,156	5,268,420
Rails—standard	50,484	.....	.....	590,039	539,320
Rails—all other	8,657	.....	.....	42,058	39,906
Joint bars	3,790	.....	.....	31,374	33,894
Tie plates	11,200	.....	.....	143,262	106,780
Track spikes	6,405	.....	.....	52,389	40,460
Wheels	26,159	65	.....	232,749	155,711
Axles	13,302	64	.....	97,102	70,795
Bars—hot rolled	690,776	205,326	4,673	6,936,291	5,646,563
Bars—reinforcing	212,885	.....	.....	2,173,462	2,034,795
Bars—cold drawn	128,866	24,490	6,905	1,408,811	1,023,417
Tool steel	1,315	7,895	.....	96,069	70,270
Standard pipe	282,675	95	.....	2,210,524	2,174,939
Oil country goods	148,290	34,702	.....	2,066,661	1,158,116
Line pipe	268,380	27	.....	2,802,527	2,608,196
Mechanical tubing	69,447	25,741	352	970,344	561,243
Pressure tubing	23,470	3,919	1,459	260,616	245,353
Drawn wire	313,633	4,400	3,508	2,725,598	2,362,887
Nails & staples	43,715	.....	.....	391,694	417,704
Barbed wire	3,397	.....	.....	48,745	56,031
Wire fence	8,522	.....	.....	141,514	157,070
Bale ties, etc.	3,580	.....	.....	55,542	57,366
Black plate	57,309	.....	.....	562,147	621,096
Tin plate—HD	31,487	.....	.....	412,123	447,396
Tin plate—electro	464,080	.....	.....	4,858,511	5,040,190
Sheets—hot rolled	917,270	35,689	3,527	7,844,519	6,291,266
Sheets—cold rolled	1,573,096	5,310	20,113	12,751,072	10,325,661
Sheets—galvanized	301,911	.....	.....	2,772,835	2,828,848
Sheets—other coated	29,311	.....	.....	280,336	190,063
Elec. sheets—strip	5,409	65,456	.....	632,310	476,205
Strip—hot rolled	161,735	2,732	743	1,272,691	1,048,164
Strip—cold rolled	125,984	1,877	25,084	1,393,100	981,009
Totals (1959)	7,585,670	548,261	77,116	69,377,067	.....
Totals (1958)	5,089,597	373,042	49,730	.....	59,914,433

Data from the American Iron & Steel Institute.

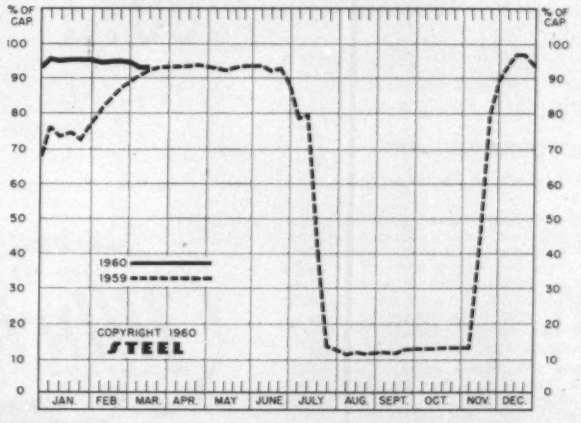
DISTRICT INGOT RATES

(Percentage of capacity utilized)

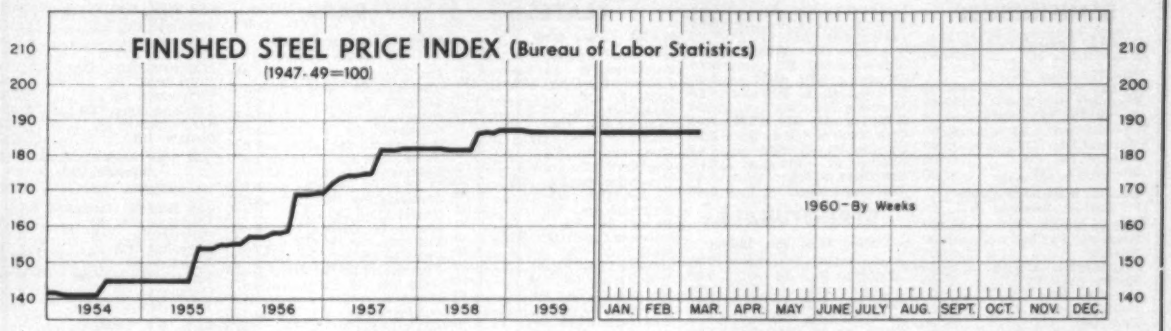
	Week Ended Mar. 13	Week Ago	Month Ago	Year Ago
Northeastern	90	90	96	96
Buffalo	99	99	99	101
Pittsburgh	97	96	97	95
Youngstown	85	87	89	84
Cleveland	103	97	101	94
Detroit	100	102	100	100
Chicago	95	96	96	93
Cincinnati	102	104	105	84
St. Louis	96	97	93	99
Southern	87	86	87	91
Western	87	88	90	85
Total Industry	92.9	92.8	94.3	92.0
Index (1947-49=100)	164.8	164.7	167.3	162.1
Net Tons (In thousands)	2,647	2,645	2,687	2,604

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Mar. 8, 1960	Week Ago	Month Ago	Feb. Index	Year Ago
186.8	186.8	186.8	186.8	186.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 8

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, Reinforcing	6.385
Rails, Light, 40 lb	7.292	Bars, C.F., Carbon	10.710
Tie Plates	6.875	Bars, C.F., Alloy	14.125
Axles, Railway	10.175	Bars, C.F., Stainless, 302 (lb)	0.570
Wheels, Freight Car, 33 in. (per wheel)	62.000	Sheets, H.R., Carbon	6.350
Plates, Carbon	6.350	Sheets, C.R., Carbon	7.300
Structural Shapes	6.167	Sheets, Galvanized	8.765
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Strip, C.R., Carbon	9.489
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Alloy	10.775	Strip, H.R., Carbon	6.250
Bars, H.R., Stainless, 303 (lb)	0.543	Pipe, Black, Buttweld (100 ft)	19.905
Bars, H.R., Carbon	6.675	Pipe, Galv., Buttweld (100 ft)	23.585
		Pipe, Line (100 ft)	199.533
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200	Black Plate, Canmaking Quality (95 lb base box)	7.900
Tubing, Mechanical, Carbon (100 ft)	27.005	Wire, Drawn, Carbon	10.575
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608	Wire, Drawn, Stainless, 430 (lb)	0.665
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100	Bale Ties (bundles)	7.967
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800	Nails, Wire, 8d Common	9.825
		Wire, Barbed (80-rod spool)	8.766
		Woven Wire Fence (20-rod roll)	21.880

STEEL's FINISHED PRICE INDEX*

	Mar. 9 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$117.82
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	34.33	35.00	41.50	41.67	37.33

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Mar. 9 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton

	Mar. 9 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	55.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$34.50	$35.50	$42.50	$44.50	$38.50
No. 1 Heavy Melt, E. Pa.	36.00	36.00	41.00	38.00	39.50
No. 1 Heavy Melt, Chicago	32.50	33.50	41.00	42.50	34.00
No. 1 Heavy Melt, Valley	36.50	37.50	43.50	45.50	37.50
No. 1 Heavy Melt, Cleve.	33.50	34.50	40.50	41.50	35.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	36.50	39.50	32.50
Rails, Rerolling, Chicago	53.50	57.50	63.50	62.50	49.50
No. 1 Cast, Chicago	45.50	46.50	53.50	48.50	40.00

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	25.25

Steel Prices

Mill prices as reported to STEEL, Mar. 9, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 145; footnotes, page 147.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ..... $76.00

INGOTS, Alloy (NT)
Detroit S41 ..... $82.00
Economy,Pa. B14 ..... 82.00
Farrell,Pa. S3 ..... 82.00
Lowellville,O. S3 ..... 82.00
Midland,Pa. C18 ..... 82.00
Munhall,Pa. U5 ..... 82.00
Sharon,Pa. S3 ..... 82.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bartonville,Ill. K4 ... $82.00
Bessemer,Pa. U5 ..... 80.00
Buffalo R2 ..... 80.00
Clairton,Pa. U5 ..... 80.00
Ensley,Ala. T2 ..... 80.00
Fairfield,Ala. T2 ..... 80.00
Fontana,Calif. K1 ..... 90.50
Gary,Ind. U5 ..... 80.00
Johnstown,Pa. B2 ..... 80.00
Lackawanna,N.Y. B2 .. 80.00
Munhall,Pa. U5 ..... 80.00
Owensboro,Ky. G8 ... 80.00
S.Chicago,Ill. R2, U5 .. 80.00
S.Duquesne,Pa. U5 ... 80.00
Sterling,Ill. N15 ..... 80.00
Youngstown R2 ..... 80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 .... $99.50
Buffalo R2 ..... 99.50
Canton,O. R2 ..... 102.00
Clairton,Pa. U5 ..... 99.50
Conshohocken,Pa. A3 . 104.50
Ensley,Ala. T2 ..... 99.50
Fairfield,Ala. T2 ..... 99.50
Farrell,Pa. S3 ..... 99.50
Fontana,Calif. K1 .... 109.00
Gary,Ind. U5 ..... 99.50
Geneva,Utah C11 ..... 99.50
Houston S5 ..... 104.50
Johnstown,Pa. B2 .... 99.50
Lackawanna,N.Y. B2 .. 99.50
LosAngeles B3 ..... 109.00
Midland,Pa. C18 ..... 99.50
Munhall,Pa. U5 ..... 99.50
Owensboro,Ky. G8 .... 99.50
Seattle B3 ..... 109.00
Sharon,Pa. S3 ..... 99.50
S.Chicago R2, U5, W14 99.50
S.Duquesne,Pa. U5 .... 99.50
S.SanFrancisco B3 .... 109.00
Warren,O. C17 ..... 99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 .. $119.00
Bridgeport,Conn. C32 . 119.00
Buffalo R2 ..... 119.00
Canton,O. R2, T7 .... 119.00
Conshohocken,Pa. A3 . 126.00
Detroit S41 ..... 119.00
Economy,Pa. B14 .... 119.00
Farrell,Pa. S3 ..... 119.00
Fontana,Calif. K1 .... 140.00
Gary,Ind. U5 ..... 119.00
Houston S5 ..... 124.00
Ind.Harbor,Ind. Y1 .. 119.00
Johnstown,Pa. B2 .... 119.00
Lackawanna,N.Y. B2. 119.00
LosAngeles B3 ..... 139.00
Lowellville,O. S3 .... 119.00
Massillon,O. R2 ..... 119.00
Midland,Pa. C18 .... 119.00
Munhall,Pa. U5 ..... 119.00
Owensboro,Ky. G8 .... 119.00
Sharon,Pa. S3 ..... 119.00
S.Chicago R2,U5,W14 119.00
S.Duquesne,Pa. U5 ... 119.00
Struthers,O. Y1 ..... 119.00
Warren,O. C17 ..... 119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ..... $122.50
Canton,O. R2 ..... 125.00
Cleveland R2 ..... 122.50
Gary,Ind. U5 ..... 122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 .. 122.50
Warren,O. C17 ..... 122.50

SKELP
Aliquippa,Pa. J5 ..... 5.05
Ind.Harbor,Ind. Y1 .... 5.05
Munhall,Pa. U5 ..... 5.05
Pittsburgh J5 ..... 5.05
Warren,O. R2 ..... 5.05
Youngstown R2, U5 .... 5.05

WIRE RODS
AlabamaCity,Ala. R2 .. 6.40
Aliquippa,Pa. J5 ..... 6.40
Alton,Ill. L1 ..... 6.60
Bartonville,Ill. K4 ..... 6.50
Buffalo W12 ..... 6.40
Cleveland A7 ..... 6.40
Donora,Pa. A7 ..... 6.40
Fairfield,Ala. T2 ..... 6.40
Houston S5 ..... 6.65
IndianaHarbor,Ind. Y1 .. 6.40
Johnstown,Pa. B2 ..... 6.40
Joliet,Ill. A7 ..... 6.40
KansasCity,Mo. S5 .... 6.65
Kokomo,Ind. C16 ..... 6.50
LosAngeles B3 ..... 7.20
Minnequa,Colo. C10 .... 6.65
Monessen,Pa. P7 ..... 6.40
Pittsburg,Calif. C11 .... 7.20
Portsmouth,O. P12 .... 6.40
Roebling,N.J. R5 ..... 6.50
S.Chicago,Ill. R2, W14.. 6.40
SparrowsPoint,Md. B2 .. 6.50
Sterling,Ill.(1) N15 .... 6.40
Sterling,Ill. N15 ..... 6.50
Struthers,O. Y1 ..... 6.40
Worcester,Mass. A 7..... 6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 .. 5.50
Aliquippa,Pa. J5 ..... 5.50
Atlanta A11 ..... 5.70
Bessemer,Ala. T2 ..... 5.50
Bethlehem,Pa. B2 ..... 5.55
Birmingham C15 ..... 5.50
Clairton,Pa. U5 ..... 5.50
Fairfield,Ala. T2 ..... 5.50
Fontana,Calif. K1 .... 6.30
Gary,Ind. U5 ..... 5.50
Geneva,Utah C11 ..... 5.50
Houston S5 ..... 5.60
Ind.Harbor,Ind. I-2 ,Y1. 5.50
Johnstown,Pa. B2 ..... 5.55
Joliet,Ill. P22 ..... 5.50
KansasCity,Mo. S5 .... 5.60
Lackawanna,N.Y. B2 .. 5.55
Los Angeles B3 ..... 6.20
Minnequa,Colo. C10 .... 5.80
Munhall,Pa. U5 ..... 5.50
Niles,Calif. P1 ..... 6.25
Phoenixville,Pa. P4 .... 5.55
Portland,Oreg. O4 ..... 6.25
Seattle B3 ..... 6.25
S.Chicago, Ill. U5, W14. 5.50
S.SanFrancisco B3 .... 6.15
Sterling,Ill. N15 ..... 5.50
Torrance, Calif. C11 .... 6.20
Weirton,W.Va. W6 .... 5.50

Wide Flange
Bethlehem,Pa. B2 ..... 5.55
Clairton,Pa. U5 ..... 5.50
Fontana,Calif. K1 .... 6.45
IndianaHarbor,Ind. I-2. 5.50
Lackawanna,N.Y. B2 .. 5.55
Munhall,Pa. U5 ..... 5.50
Phoenixville,Pa. P4 .... 5.55
S.Chicago,Ill. U5 ..... 5.50
Sterling,Ill. N15 ..... 5.50
Weirton,W.Va. W16 .... 5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 6.90
Munhall,Pa. U5 ..... 6.80
S.Chicago,Ill. U5, W14.. 6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ..... 8.05
Bessemer,Ala. T2 ..... 8.05
Bethlehem,Pa. B2 ..... 8.10
Clairton,Pa. U5 ..... 8.05
Fairfield,Ala. T2 ..... 8.05
Fontana,Calif. K1 .... 8.85
Gary,Ind. U5 ..... 8.05
Geneva,Utah C11 ..... 8.05
Houston S5 ..... 8.15
Ind.Harbor,Ind. I-2, Y1. 8.05
Johnstown,Pa. B2 ..... 8.10
KansasCity,Mo. S5 .... 8.15
Lackawanna,N.Y. B2 .. 8.10
LosAngeles B3 ..... 8.75
Munhall,Pa. U5 ..... 8.05
Seattle B3 ..... 8.80
S.Chicago,Ill. U5, W14.. 8.05
S.SanFrancisco B3 .... 8.70
Sterling,Ill. N15 ..... 7.75
Struthers,O. Y1 ..... 8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ..... 8.10
Ind.Harbor,Ind. I-2 .... 8.05
Lackawanna,N.Y. B2 .. 8.10
Munhall,Pa. U5 ..... 8.05
S.Chicago,Ill. U5 ..... 8.05
Sterling,Ill. N15 ..... 7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ..... 5.55
Ind.Harbor,Ind. I-2 .... 5.50
Lackawanna,N.Y. B2 .. 5.55
Munhall,Pa. U5 ..... 5.50
S.Chicago,Ill. I-2, U5 .. 5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 .... 6.50
Lackawanna,N.Y. B2 .. 6.50
Munhall,Pa. U5 ..... 6.50
S.Chicago,Ill. I-2, U5 .. 6.50
Weirton,W.Va. W6 .... 6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 .. 5.30
Aliquippa,Pa. J5 ..... 5.30
Ashland,Ky.(15) A10 .. 5.30
Atlanta A11 ..... 5.50
Bessemer,Ala. T2 ..... 5.30
Clairton,Pa. U5 ..... 5.30
Claymont,Del. C22 .... 5.30
Cleveland J5, R2 ..... 5.30
Coatesville,Pa. L7 .... 5.30
Conshohocken,Pa. A3 .. 5.30
Ecorse,Mich. G5 ..... 5.30
Fairfield,Ala. T2 ..... 5.30
Farrell,Pa. S3 ..... 5.30
Fontana,Calif.(30) K1 .. 6.10
Gary,Ind. U5 ..... 5.30
Geneva,Utah C11 ..... 5.30
GraniteCity,Ill. G4 .... 5.40
Harrisburg,Pa. P4 ..... 5.30
Houston S5 ..... 5.40
Ind.Harbor,Ind. I-2, Y1. 5.30
Johnstown,Pa. B2 ..... 5.30
Lackawanna,N.Y. B2 .. 5.30
Mansfield,O. E6 ..... 5.30
Minnequa,Colo. C10 .... 6.15
Munhall,Pa. U5 ..... 5.30
Newport,Ky. A2 ..... 5.30
Pittsburgh J5 ..... 5.30
Riverdale,Ill. A1 ..... 5.30
Seattle B3 ..... 6.20
Sharon,Pa. S3 ..... 5.30
S.Chicago,Ill. U5, W14.. 5.30
SparrowsPoint,Md. B2 .. 5.30
Sterling,Ill. N15 ..... 5.30
Steubenville,O. W10 .... 5.30
Warren,O. R2 ..... 5.30
Youngstown U5, Y1 .... 5.30
Youngstown(27) R2 .... 5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 .... 7.05
Fontana,Calif. K1 .... 7.85
Geneva,Utah C11 ..... 7.05
Houston S5 ..... 7.15
Johnstown,Pa. B2 ..... 7.05
SparrowsPoint,Md. B2 .. 7.05

PLATES, Wrought Iron
Economy,Pa. B14 ..... 14.10

PLATES, H.S. L.A.
Aliquippa,Pa. J5 ..... 7.95
Ashland,Ky. A10 ..... 7.95
Bessemer,Ala. T2 ..... 7.95
Clairton,Pa. U5 ..... 7.95
Claymont,Del. C22 .... 7.95
Cleveland J5, R2 ..... 7.95
Coatesville,Pa. L7 .... 7.95
Conshohocken,Pa. A3 .. 7.95
Economy,Pa. B14 .... 7.95
Ecorse,Mich. G5 ..... 7.95
Fairfield,Ala. T2 ..... 7.95
Farrell,Pa. S3 ..... 7.95
Fontana,Calif.(30) K1 . 8.75
Gary,Ind. U5 ..... 7.95
Geneva,Utah C11 ..... 7.95
Houston S5 ..... 8.05
Ind.Harbor,Ind. I-2, Y1. 7.95
Johnstown,Pa. B2 ..... 7.95
Munhall,Pa. U5 ..... 7.95
Pittsburgh J5 ..... 7.95
Seattle B3 ..... 8.85
Sharon,Pa. S3 ..... 7.95
S.Chicago,Ill. U5, W14.. 7.95
SparrowsPoint,Md. B2 .. 7.95
Warren,O. R2 ..... 7.95
Youngstown U5, Y1 .... 7.95

PLATES, Alloy
Aliquippa,Pa. J5 ..... 7.50
Claymont,Del. C22 .... 7.50
Coatesville,Pa. L7 .... 7.50
Economy,Pa. B14 ..... 7.50
Farrell,Pa. S3 ..... 7.50
Fontana,Calif. K1 .... 8.30
Gary,Ind. U5 ..... 7.50
Houston S5 ..... 7.60
Ind.Harbor,Ind. Y1 .... 7.50
Johnstown,Pa. B2 ..... 7.50
Lowellville,O. S3 ..... 7.50
Munhall,Pa. U5 ..... 7.50
Newport,Ky. A2 ..... 7.50
Pittsburgh J5 ..... 7.50
Seattle B3 ..... 8.40
Sharon,Pa. S3 ..... 7.50
S.Chicago,Ill. U5, W14.. 7.50
SparrowsPoint,Md. B2. 7.50
Youngstown Y1 ..... 7.50

FLOOR PLATES
Cleveland J5 ..... 6.375
Conshohocken,Pa. A3 . 6.375
Ind.Harbor,Ind. I-2 ... 6.375
Munhall,Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
S.Chicago,Ill. U5 ..... 6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10 .. 5.55
Ashland l.c.l. (15) A10 . 6.05
Cleveland c.l. R2 ..... 6.05
Warren,O. R2 ..... 6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ... 5.675
Aliquippa,Pa.(9) J5 .... 5.675
Alton,Ill. L1 ..... 5.875
Atlanta(9) A11 ..... 5.875
Bessemer,Ala.(9) T2 .. 5.675
Birmingham(9) C15 .. 5.675
Buffalo(9) R2 ..... 5.675
Canton,O.(23) R2 ..... 6.15
Clairton,Pa.(9) U5 .... 5.675
Cleveland(9) R2 ..... 5.675
Ecorse,Mich.(9) G5 .... 5.675
Emeryville,Calif. J7 .... 6.425
Fairfield,Ala.(9) T2 .. 5.675
Fairless,Pa.(9) U5 .... 5.825
Fontana, Calif.(9) K1 .. 6.375
Gary,Ind.(9) U5 ..... 5.675
Houston(9) S5 ..... 5.925
Ind.Harbor(9) I-2, Y1.. 5.675
Johnstown,Pa.(9) B2 .. 5.675
Joliet,Ill. P2 ..... 5.675
KansasCity,Mo.(9) S5.. 5.925
Lackawanna(9) B2 .... 5.675
LosAngeles(9) B3 ..... 6.375
Massillon,O.(23) R2 .... 6.15
Midland,Pa.(23) C18 .... 6.025
Milton,Pa. M18 ..... 5.825
Minnequa,Colo. C10 .... 6.125
Niles,Calif. P1 ..... 6.375
Owensboro,Ky.(9) G8.. 6.025
Pittsburg,Calif.(9) C11. 6.375
Pittsburgh(9) J5 ..... 5.675
Portland,Oreg. O4 .... 6.425
Riverdale,Ill.(9) A1 .... 5.675
Seattle A24, B3, N15 .. 6.425
S.Ch'c'g'o(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5.. 5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15 .. 5.675
Sterling,Ill.(9) N15 .... 5.775
Struthers,O.(9) Y1 .... 5.675
Tonawanda,N.Y. B12 .. 5.675
Torrance,Calif.(9) C11 . 6.375
Warren,O. C17 ..... 6.025
Youngstown(9) R2,U5.. 5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.725
Bethlehem,Pa. B2 ..... 6.725
Bridgeport,Conn. C32 ... 6.80
Buffalo R2 ..... 6.725
Canton,O. R2, T7 .... 6.725
Clairton,Pa. U5 ..... 6.725
Detroit S41 ..... 6.725
Economy,Pa. B14 ..... 6.725
Ecorse,Mich. G5 ..... 6.725
Fairless,Pa. U5 ..... 6.875
Farrell,Pa. S3 ..... 6.725
Fontana,Calif. K1 .... 7.775
Gary,Ind. U5 ..... 6.725
Houston S5 ..... 6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ..... 6.725
KansasCity,Mo. S5 .... 6.975
Lackawanna,N.Y. B2 .. 6.725
LosAngeles B3 ..... 7.775
Lowellville,O. S3 ..... 6.725
Massillon,O. R2 ..... 6.725
Midland,Pa. C18 ..... 6.725
Owensboro,Ky. G8 .... 6.725
Pittsburgh J5 ..... 6.725
Sharon,Pa. S3 ..... 6.725
S.Chicago R2, U5, W14. 6.725
S.Duquesne,Pa. U5 .... 6.725
Struthers,O. Y1 ..... 6.725
Warren,O. C17 ..... 6.725
Youngstown U5 ..... 6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ..... 8.30
Bessemer,Ala. T2 ..... 8.30
Bethlehem,Pa. B2 ..... 8.30
Clairton,Pa. U5 ..... 8.30
Cleveland R2 ..... 8.30
Ecorse,Mich. G5 ..... 8.30
Fairfield,Ala. T2 ..... 8.30
Fontana,Calif. K1 .... 9.00
Gary,Ind. U5 ..... 8.30
Houston S5 ..... 8.55
Ind.Harbor,Ind. Y1 .... 8.30
Johnstown,Pa. B2 ..... 8.30
KansasCity,Mo. S5 .... 8.55
Lackawanna,N.Y. B2 .. 8.30
LosAngeles B3 ..... 9.00
Pittsburgh J5 ..... 8.30
Seattle B3 ..... 9.05
S.Chicago,Ill. R2, W14.. 8.30
S.Duquesne,Pa. U5 .... 8.30
S.SanFrancisco B3 .... 9.05
Struthers,O. Y1 ..... 8.30
Youngstown U5 ..... 8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 .. 5.825
Houston(9) S5 ..... 5.925
KansasCity,Mo.(9) S5.. 5.925
Lackawanna(9) B2 .... 5.675
Sterling,Ill. N15 ..... 5.775
Sterling,Ill.(1) N15 .... 5.675
Tonawanda,N.Y. B12 .. 5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ..... 5.675
Atlanta A11 ..... 5.875
Joliet,Ill. P22 ..... 5.675
Minnequa,Colo. C10 .... 6.125
Niles,Calif. P1 ..... 6.375
Pittsburgh J5 ..... 5.675
Portland,Oreg. O4 ..... 6.425
SanFrancisco S7 ..... 6.52
Seattle B3 ..... 6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ..... 16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 7.05
KansasCity,Mo. S5 .... 7.05
Pittsburgh J5 ..... 6.80
Youngstown U5 ..... 6.80

BARS, C.F. Loaded (Including loaded extra)
Carbon
LosAngeles P2, S30 ... 11.75*
Alloy
Ambridge,Pa. W18 ... 10.175
BeaverFalls,Pa. M12.. 10.175
Camden,N.J. P13 ..... 10.35
Chicago W18 ..... 10.175
Elyria,O. W8 ..... 10.175
Monaca,Pa. S17 ..... 10.175
Newark,N.J. W18 ..... 10.35
SpringCity,Pa. K3 .... 10.35

*Grade A; add 0.05c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ..... 7.65
BeaverFalls,Pa. M12,R2. 7.65
Birmingham C15 ..... 8.25
Buffalo B5 ..... 7.70
Camden,N.J. P13 ..... 8.10
Carnegie,Pa. C12 ..... 7.65
Chicago W18 ..... 7.65
Cleveland A7, C20 ..... 7.65
Detroit B5, P17 ..... 7.85
Detroit S41 ..... 7.65
Donora,Pa. A7 ..... 7.65
Elyria,O. W8 ..... 7.65
FranklinPark,Ill. N5 .... 7.65
Gary,Ind. R2 ..... 7.65
GreenBay,Wis. F7 ..... 7.65
Hammond,Ind. J5, L2.. 7.65
Hartford,Conn. R2 ..... 8.15
Harvey,Ill. B5 ..... 7.65
LosAngeles(49) S30 .... 9.10
LosAngeles(49) P2, R2. 9.10
Mansfield,Mass. B5 .... 8.20
Massillon,O. R2, R8 .... 7.65
Midland,Pa. C18 ..... 7.65
Monaca,Pa. S17 ..... 7.65
Newark,N.J. W18 ..... 8.10
NewCastle,Pa.(17) B4 .. 7.65
Pittsburgh J5 ..... 7.65
Plymouth,Mich. P5 .... 7.90
Putnam,Conn. W18 .... 8.20
Readville,Mass. C14 .... 8.20
S.Chicago,Ill. W14 .... 7.65
SpringCity,Pa. K3 ..... 8.10
Struthers,O. Y1 ..... 7.65
Warren,O. C17 ..... 7.65
Waukegan,Ill. A7 ..... 7.65
Willimantic,Conn. J5 ... 8.15
Youngstown F3, Y1 .... 7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19. 6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 .... 9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .... 9.025
Bridgeport,Conn. C32 .. 9.175
Buffalo B5 ..... 9.025
Camden,N.J. P13 ..... 9.20
Canton,O. T7 ..... 9.025
Carnegie,Pa. C12 ..... 9.025
Chicago W18 ..... 9.025
Cleveland A7, C20 .... 9.025
Detroit B5, P17 ..... 9.225
Detroit S41 ..... 9.025
Donora,Pa. A7 ..... 9.025
Elyria,O. W8 ..... 9.025
FranklinPark,Ill. N5 .. 9.025
Gary,Ind. R2 ..... 9.025
GreenBay,Wis. F7 .... 9.025
Hammond,Ind. J5, L2.. 9.025
Hartford,Conn. R2 .... 9.325
Harvey,Ill. R5 ..... 9.025
Lackawanna,N.Y. B2 .. 9.025
LosAngeles P2, S30 ... 11.00
Mansfield,Mass. B5 .... 9.325
Massillon,O. R2, R8 .... 9.025
Midland,Pa. C18 ..... 9.025
Monaca,Pa. S17 ..... 9.025
Newark,N.J. W18 ..... 9.20
Plymouth,Mich. P5 .... 9.225
S.Chicago,Ill. W14 .... 9.025
SpringCity,Pa. K3 ..... 9.20
Struthers,O. K1 ..... 9.025
Warren,O. C17 ..... 9.025

Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ....9.325
Worcester,Mass. A7 ....9.325
Youngstown F3, Y1 ....9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.675
Birmingham C15 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft. Worth,Tex(4)(26)T4 5.925
Gary,Ind. U5 .....5.675
Houston S5 .....5.925
Ind. Harbor,Ind. I2,Y1 5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.925
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 .5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.925
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ....6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.60
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ..7.60
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ....7.33
St. Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa. (3) F5 ..5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O. (3) P11 ....5.575
Tonawanda (3) B12 ...5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind. Harbor,Ind. I-2, Y1..5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ....5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 ..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H.R., Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..5.35
Cleveland R2 .....5.875
Warren, O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ...6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Youngstown U5, Y1 ....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ....6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ....6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt., Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ...7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) .9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H.K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.
H1 Hanna Furnace Corp.
H7 Helical Tube Co.
I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.
J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
T2 Tenn. Coal & Iron
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.
U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.
V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.
W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackawanna,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
San Francisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.525
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.525
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, E5	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3	7.975
Pawtucket,R.I. N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale,Ill. A1	7.525
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton N.J.(31) R5	8.875
Wallingford,Conn. W2	7.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie,Pa. S18	15.55
Cleveland A7	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. N8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fosto.ia,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Wallingford,Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	0.80C	1.05C	1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fosoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ..7.50*
Riverdale,Ill. A1 ....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1..7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.65
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.60
Ind.anaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9 35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Ind.Harb. Y1	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$8.20
Fairfield Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)	
Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)	
Gary,Ind. U5	$10.05
Irvin,Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield O. E6	9.875*	11.70	12.40	13.55	14.65
Newport Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65
					Stator
Vandergrift,Pa. U5					8.10
Mansfield,O. E6					8.10
Warren,O. R2 (Silicon Lowcore)					8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A13	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
Rankin,Pa. A7	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	13.40
KansasCity, Mo. U3	12.90
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md. B2	13.50
Struthers,O. Y1	13 40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Minneque,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.05
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity Mo. S5, U3	10.00
LosAngeles B3	10.70
Milbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt., Md. B2	9.85
Struthers O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester Mass.A7,J4,T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.35
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie, Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen Pa. P16	17.15
Roebling,N.J. R5	17.65

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
KansasCity,Mo. U3	13.70
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

Wire, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock — **Col.**

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES — **Col.**

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$9.24
Atlanta A11	10.36
Bartonville,Ill. K4	9.34
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	9.34
Donora,Pa. A7	9.24
Duluth A7	9.24
Fairfield,Ala. T2	9.24
Houston S5	10.51
Jacksonville,Fla. M8	9.34
Johnstown,Pa. B2	9.24
Joliet,Ill. A7	9.24
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	*8.88*
LosAngeles B3	9.94
Minnequa,Colo. C10	9.49
Pittsburg,Calif. C11	9.94
S.Chicago,Ill. R2	9.24
S.SanFrancisco C10	9.94
SparrowsPt.Md. B2	9.34
Sterling,Ill.(37) N15	9.34

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.54
Atlanta A11	10.70
Bartonville,Ill. K4	9.64
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.64
Donora,Pa. A7	9.54
Duluth A7	9.54
Fairfield,Ala. T2	9.54
Houston S5	10.85
Jacksonville,Fla. M8	9.64
Johnstown,Pa. B2	9.54
KansasCity,Mo. S5	10 85
Kokomo,Ind. C16	*9.16*
LosAngeles B3	10.26
Minnequa,Colo. C10	9.79
Pittsburg,Calif. C11	10.28
S.Chicago,Ill. R2	9.54
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.64
Sterling,Ill.(37) N15	9.64

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.59
Atlanta A11	10.75
Bartonville,Ill. K4	9.69
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.69
Donora,Pa. A7	9.59
Duluth A7	9.59
Fairfield,Ala. T2	9.59
Houston S5	10.90
Jacksonville,Fla. M8	9.69
Johnstown,Pa. B2	9.59
Joliet,Ill. A7	9.59
KansasCity,Mo. S5	10 90
Kokomo,Ind. C16	*9.21*
LosAngeles B3	10.37
Minnequa,Colo. C10	9.84
Pittsburg,Calif. C11	10.31
S.Chicago,Ill. R2	9.59
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.69
Sterling,Ill.(37) N15	9.69

BALE TIES, Single Loop — **Col.**

AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — **Col.**

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — **Col.**

AlabamaCity,Ala. R2	193*
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill(7) N15	198

WOVEN FENCE, 9-15 Ga. — **Col.**

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)	**An'ld Galv.**	**Stone Stone**
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.25	18.80†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran.C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality

(6 to 8 gage)	**An'ld Galv.**	
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48)A11	9.10	9.775§
Bartonville(48) K4	9.10	9.80
Buffalo W12	9.00	9.55†
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80†‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48) N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts, per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nuts 1⅛ in. through 1½ in. tapped S threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, standard stock sizes:

Plain Finish	50
Hot Galvanized and zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

CAP AND SETSCREWS

Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam, 6 in. and shorter:	
Packages	+ 5
Bulk	+19
Through 1 in. diam., longer than 6 in.:	
Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

⅞ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$28.95	$43.40	$55.40	$73.00	$95.10
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Cleveland A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	29.85	43.00	55.40	73.00	95.10
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
NewHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	28.95	43.40	55.40	73.00	95.10
Minnequa,Colo. C10	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
SparrowsPoint,Md. B2	28.95	43.40	55.40	73.00	95.10
St. Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.96
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.60	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 3 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Ded. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(38) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	H.R. Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	50.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp., American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.55	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	$36.80	$44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% Silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles, Tenn. T3 (Phos. 0.035% max)	$73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075%)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Galv. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††[4]		Carbon	Floor
Atlanta	8.59‡	9.86‡	10.13	....	8.91	9.39	13.24#	....	9.40	9.29	11.21
Baltimore	8.54[a]	10.00[b]	10.06	....	10.94[c]	9.33[d]	10.80#	16.38	9.55	9.15[a]	10.50
Birmingham	9.43[a]	10.20[b]	....	....	10.41[c]	9.09[d]	13.14#	16.76	9.00	9.29[e]	10.90
Boston	10.07	11.42	11.77	53.50	12.17	10.19	13.30#	15.64	10.64	10.27	11.95
Buffalo	8.80[a]	9.95[b]	11.15	55.98	10.65[c]	9.00[d]	11.45#	15.40	9.25	9.00[e]	10.85[f]
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.25	9.45	10.90	53.00	8.51	8.99	9.15	15.06	9.00	8.89	10.20
Cincinnati	8.43	9.51	10.95	53.43	8.83	9.31	11.58#	15.37	9.56	9.27	10.53
Cleveland	8.73[a]	9.88[b]	11.14	52.33	10.51[c]	8.96[d]	11.25#	15.16	9.75	8.92[e]	10.56[f]
Dallas	8.80	9.30	....	....	8.85	8.80	....	....	8.75	9.15	10.40
Denver	9.40	11.84	12.94	....	9.43	9.80	11.19	....	9.84	9.76	11.08
Detroit	8.51	9.71	11.25	56.50	8.88	9.30	9.51	15.33	9.56	9.26	10.46
Erie, Pa.	8.35	9.45	9.95[10]	....	8.60	9.10	11.25	....	9.35	9.10	10.60
Houston	9.67[a]	10.00[b]	12.19	52.00	11.28[c]	9.13[d]	13.10#	16.55	9.34	9.47[e]	11.31[f]
Jackson, Miss.	8.52	9.79	....	....	8.84	9.82	10.68	....	9.33	9.22	11.03
Los Angeles	8.70[2]	10.82[2]	12.20	57.60	9.15	9.10[2]	12.95[2]	16.35	9.00[2]	9.10[2]	11.30[2]
Memphis, Tenn.	8.59	9.80	....	....	8.84	9.32	11.25#	....	9.33	9.22	10.86
Milwaukee	8.39	9.59	11.04	....	8.65	9.13	9.39	15.19	9.22	9.03	10.34
Moline, Ill.	8.55	9.80	....	....	8.84	8.95	9.15	....	8.99	8.91	....
New York	9.36[a]	10.13[b]	11.45[g]	53.08	11.46[c]	9.74[d]	13.25#	15.50	9.74	9.51[e]	11.05[f]
Norfolk, Va.	8.65	....	....	....	9.15	9.30	12.75	....	9.65	9.10	10.50
Philadelphia	9.15[a]	9.55	10.89	52.17	11.10[c]	9.50[d]	11.95#	15.48	9.10	9.55[e]	10.55[f]
Pittsburgh	8.73[a]	9.88[b]	11.03	52.33	10.49[c]	8.85[d]	11.25#	15.05	9.00	8.68[e]	10.32[f]
Richmond, Va.	8.65	....	10.79	....	9.15	9.55	....	....	9.65	9.10	10.60
St. Louis	8.64[a]	9.83	11.28	....	10.30[c]	8.75[d]	9.78	15.43	9.25	8.60[e]	10.37[f]
St. Paul	9.00[a]	9.59[b]	10.74	....	10.66[c]	9.12[d]	11.49#	16.54	9.63	8.95[e]	10.49
San Francisco	9.65	11.10	11.55	55.10	9.75	10.15	13.60	16.25	9.85	10.00	12.35
Seattle	10.30	11.55	12.50	56.52	10.25	10.50	14.70	16.80[3]	10.20	10.10	12.50
South'ton, Conn.	9.07	10.33	10.71	....	9.45	9.74	....	....	9.57	9.57	10.91
Spokane, Wash.	10.30	11.55	12.50	57.38	10.75	11.00	14.70	16.80	10.20	10.10	13.00
Washington	9.15	....	....	....	9.65	10.05	12.50	....	10.15	9.60	11.10

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **¼ in. and heavier; ††as annealed; #net price, 1 in. round C-1018.

[a]10 Ga.; [b]20 Ga.; [c]¼ x 1 in.; [d]¾-2⅛ in.; [e]¼ x 84 in.; [f]½ x 36 in.; [g]10 x 48 x 120 in.

Base quantities, 2000 to 4999 lb except as noted; cold-finished bars, 2000 lb and over except in Seattle, 2000 to 3999 lb; stainless sheets, 3000 lb except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Seattle, 30,000 lb and over; [2]—30,000 lb; [3]—1000 to 4999 lb; [4]—1000 to 1999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 Per Cent: St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ¾ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid $28-$28.50; barge, Brownsville, Tex., $30-$31.

Ores

Lake Superior Iron Ore

(Prices effective at start of the 1959 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1959, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	21.00†
Brazilian iron ore, 68.5%	21.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.00-19.50
Domestic, concentrates, f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian, 48-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.00†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

50-55%	$2.50-2.75
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Diam (Inches)	Length (Inches)	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36 50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in. (In contract lots of 240 tons price is 22.75c)	28.75
Annealed, 99.5% Fe	36.75
Unannealed (99+% Fe)	33.25
Unannealed (99+% Fe) (minus 325 mesh)	58.25
Powder Flake (minus 16 plus 100 mesh)	29.25
Carbonyl Iron: 98.1-98.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500-lb drum freight allowed, c.l. 38.50; ton lots 40.50	
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	35.10-52.20†
Bronze, 5000-lb lots	53.10-52.70†
Copper, electrolytic	14.25*
Copper, reduced	14.25*
Lead	7.50*
Manganese, Electrolytic: Minus 35 mesh	$1.00
Nickel	$1.15
Nickel-Silver, 5000-lb lots	60.70-69.00†
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	46.50-64.50
Solder	7.00*
Silicon	70.00*
Stainless Steel, 304	89.00*
Stainless Steel, 316	$1.07
Tin	14.00*
Zinc, 5000-lb lots	21.20-34.40‡
Tungsten: Carbon reduced, 98.8% min., minus 65 mesh	Dollars nom.**
Chromium electrolytic 99.8% Cr, min., metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scarfing grade. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.95	$6.00	$5.85	$5.70	$6.10
Bar Size Angles	5.95	6.00	5.85	5.75	6.10
Structural Angles	5.86	5.91	5.76	5.66	6.01
I-Beams	5.86	5.91	5.76	5.66	6.01
Channels	5.86	5.91	5.76	5.66	6.01
Plates (basic bessemer)	5.93	6.03	5.88	5.78	6.13
Sheets, H.R.	7.50	7.55	7.40	7.30	7.65
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	9.70	9.75	9.60	9.50	9.85
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	9.80	9.85	9.70	9.60	9.95
Sheets, C.R. (drawing quality)	10.70	10.75	10.60	10.50	10.85
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.08	24.20	24.42	24.15	25.47
Barbed Wire (†)	6.50	6.55	6.40	6.30	6.65
Merchant Bars	6.39	6.44	6.29	6.19	6.54
Hot-Rolled Bands	7.90	7.95	7.80	7.70	8.05
Wire Rods, Thomas Commercial No. 5	6.60	....	6.45	6.45	6.70
Wire Rods, O. H.	7.05	....	6.90	6.90	7.15
Bright Common Wire Nails (‡)	7.95	8.00	7.85	7.75	8.10

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

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(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	5.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

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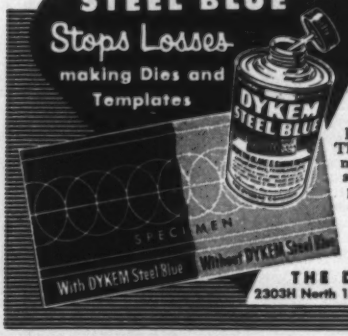

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

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. . . standard and special bearings that offer Product Designers many design improvement and cost-saving opportunities.

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Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net tons, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35 less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c.

Blocking Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c; No. 2 (Cr 58-63%, C 5-6%, Si 8-10%), 23.00c; No. 3 (Cr 58-63%, C 5-6%, Si 10-12%), 23.00c.

Refined Charge Chrome: No. 1 (Cr 50-55%, C 5% max, Si 2% max), 25.00c; No. 2 (Cr 56-60% C 5% max, Si 2% max), 25.00c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 35.75c per lb contained Cr; 0.010% max, 36.75c. Delivered.
Cr 67-71%, carload, lump, bulk, 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). SM x D, carload, bulk, 20.05c per lb of alloy carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 26.25c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 28.25c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot, packed, 2" x D plate (about ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.
Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al 40%, Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l., packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb of briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carlot bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Sigio, Tenn., $120 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

Prices of Surplus Imported Steel Cut

Excessive foreign steel stocks in the Houston area have resulted in a soft market there. Brokers have sliced prices as much as $25 a ton in an effort to liquidate distress supplies.

While selection is limited, good sized tonnages brought in during the steel strike are unsold. It is estimated it will take at least 60 days to clear away the oversupply.

Foreign steel on the futures market is more competitive. New price lists reveal further mill reductions early this month. A French mill posted cuts on rounds, flats, angles, channels, and beams. Delivery is promised within three to four months.

Early last year, before consumers began strike hedge buying, foreign prices ranged up to $40 a ton under U. S. mill prices. Deeper cuts by European mills are expected. Major brokers are selling incoming tonnage at prices below the futures quotations.

Distributors . . .

Prices, Page 149

Demand for steel from service centers is well below the rate anticipated. Customers have been able to replenish their inventories sooner than expected, and their suppliers have ample tonnages.

Demand for stainless steel in some districts is down more than that for carbon grades.

A bright spot is a gradual pickup in demand for structurals. Engineering interests are getting ready to step up construction activity with the approach of warmer weather.

Strong competition from foreign steel speculators is being encountered in some sections of the country, especially the Southwest. Some major service centers in the Houston area are countering with lower prices.

Pig Iron . . .

Pig Iron Prices, Page 149

Merchant iron producers are receiving a fair volume of orders and are channeling a considerable portion of their production into stockpiles.

Foundries are operating below capacity and are hopeful the delayed pickup in casting demand will develop soon.

Opening of the Great Lakes navigation season is expected to signal the start of heavy shipments of iron to upper lake ports. Producers in the Buffalo area look for a fair movement of iron on the barge canal to the Atlantic seaboard.

Iron Ore . . .

Iron Ore Prices, Page 150

Stocks of iron ore (U. S. and Canadian) at the end of 1959 totaled 67,254,826 gross tons (64,516,011 U. S. and 2,738,815 Canadian), reports the American Iron Ore Association. The total compares with 68,833,658 tons (65,841,574 U. S. and 2,992,084 Canadian) at the end of 1958. Stocks break down on the basis of origin:

Stocks of Iron Ore
(Gross tons)

Stocks at End of 1959	
U. S. Stocks:	
Lake Superior	32,655,747
Other U. S.	3,660,725
Canadian Lake Superior	2,028,097
Other Canadian	8,900,836
Other foreign ores	17,270,606
Total U. S.	64,516,011
Canadian Stocks:	
U. S. Lake Superior ore	1,471,322
Canadian Lake Superior ore	263,852
Other Canadian ore	964,035
Other foreign ores	39,876
Total Canada	2,738,815
Total U. S. and Canada	67,254,826

Consumption of ore in the fourth quarter of last year amounted to 21,893,512 gross tons vs. 29,302,468 in the like period of 1958. Total consumption in 1959 was 100,936,731 tons vs. 94,819,212 in the preceding year.

Bendix Lowers Prices on Electrical Connectors

Prices have been reduced 4 to 6 per cent on electrical connectors produced by the Scintilla Div., Bendix Aviation Corp., Sidney, N. Y. The connectors are for use in missiles, supersonic aircraft, and many industrial applications. The new prices became effective Mar. 1 on all new orders.

Barrel, Drum Shipments Increased Last Year

The movement of steel shipping barrels and drums in 1959 totaled 33,594,312 units, up from 31,490,568 units shipped in the preceding year, reports the U. S. Census Bureau.

December shipments were 3,161,194 units vs. 2,268,407 in November.

Shipments of steel pails last year were also ahead of 1958's—80,648,291 vs. 72,178,977.

December shipments amounted to 6,313,660 units vs. 5,370,968 in November.

Canadian Steel Output Is Still Near Capacity

Production of steel ingots in Canada during the week ended Feb. 27 amounted to 130,467 net tons, or 100.9 per cent of capacity. The rate in the preceding week: 135,875 tons, 105.1 per cent of capacity.

Canada's rated ingot capacity is now 6,719,000 tons annually. That compares with 6,313,000 tons last year.

• **Do you use ideas from STEEL? If so, you may win $1000. See the Servicenter, Pages 5 and 6.**

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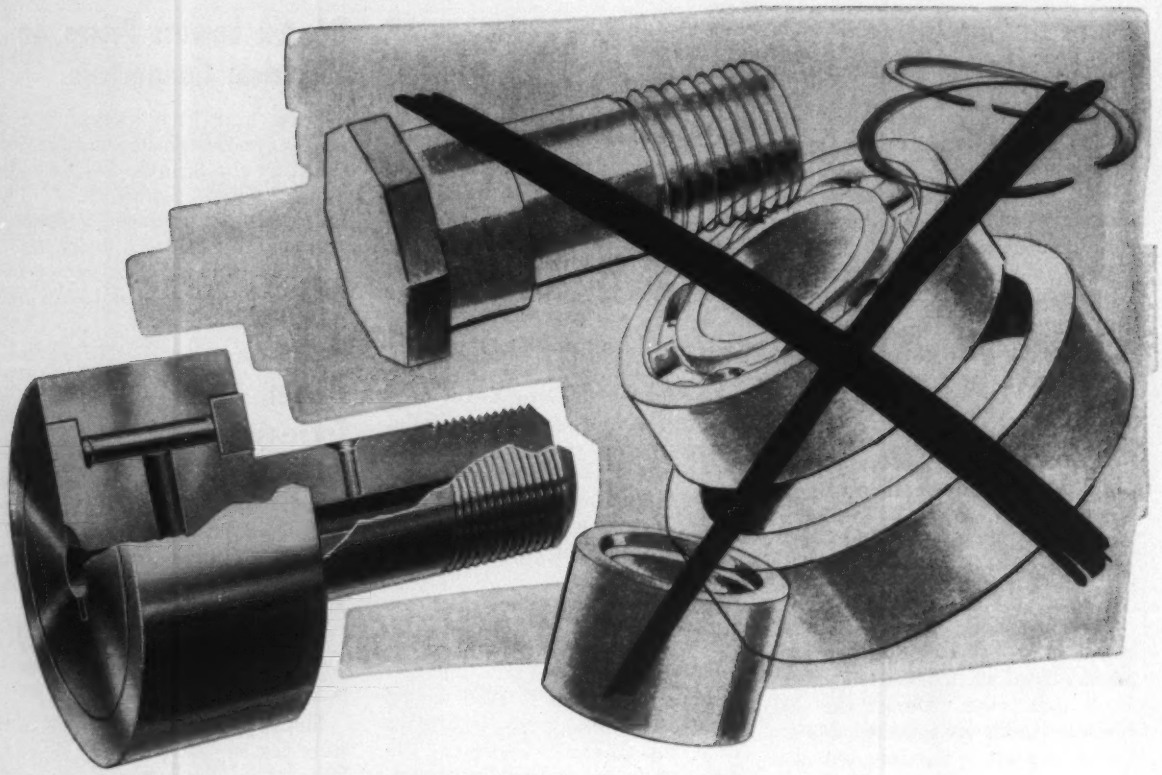

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eliminate the cost of producing and assembling improvised cam follower, track and guide roller units

THESE CAMROL ADVANTAGES SOLVE COST, DESIGN, PRODUCTION AND PERFORMANCE PROBLEMS:

• AVAILABILITY • INTEGRAL UNIT CONSTRUCTION • HIGH LOAD CAPACITY • SMALL RADIAL SPACE REQUIREMENTS • HIGH SHOCK RESISTANCE • PRECISION ACCURACY • SIMPLIFIED LUBRICATION

You can simplify design and cut cost with CAMROL, precision cam followers. Procurement, production and assembly of components for improvised units are eliminated when you specify CAMROL bearings that are available from stock.

McGill developed the original roller bearing cam follower and perfected the CAMROL design through 25 years of application experience. Its full type construction provides exceptionally high capacity in an integral unit of a flanged, specially heat treated stud and heavy shock resistant outer race. Grease lubrication is simplified. Plain bearings require constant oil lubrication and bolt mounted ball bearings races crack under equivalent loads.

Precision construction, including concentricity of stud to outer race OD, provides accurate alignment of machine members. Ease of interchangeability and dependable operation in any cam action, track, guide or support roller application is assured. Use the CYR series in the same roller diameters for shaft mounting.

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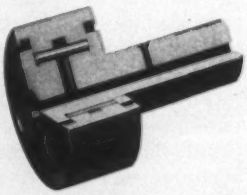

These bearings combine the advantages of CF and CYR series bearings plus effective sealing against dirt, dust and grit. Ideal in applications where lubrication is a problem. Black ferrous oxide finish resists corrosion in contaminated areas.

CAMROL bearings are available in standard roller diameters from ½" to 4". Capacities to 20480 lbs. at 100 RPM.

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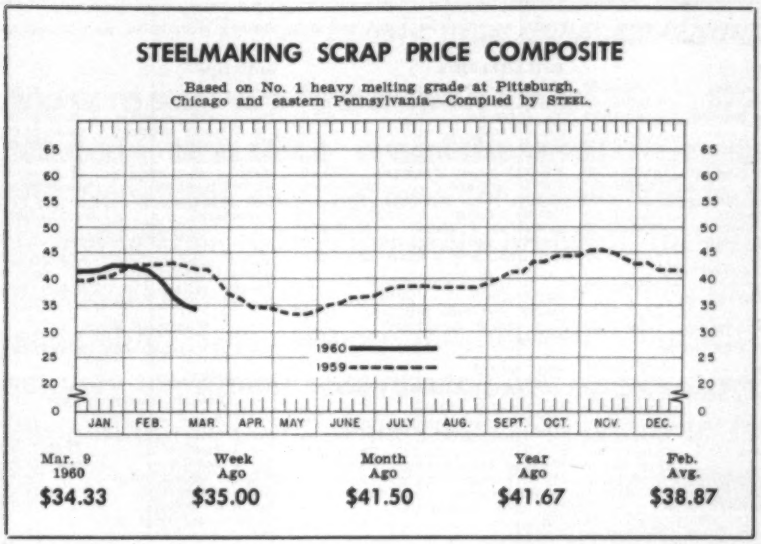


Scrap Price Decline Slowing Down

STEEL's composite on No. 1 heavy melting grade drops another 67 cents a ton to $34.33, but market shows signs of leveling out after big Japanese purchase

Scrap Prices, Page 156

• **Pittsburgh**—Prices paid for railroad scrap dropped sharply on the latest lists. In general, brokers' bids on open hearth grades were about $10 below last month's. With open hearth scrap available at the lowest prices in almost a year, demand for pig iron is minimal. Result: Blast furnace operators have no interest in turnings. Crushers are offering only $18 a ton for machine shop turnings. If there were a market for short shoveling turnings, the price would probably be no more than $25. Hopes for an upturn are based on two factors: 1. Recent heavy snows have slowed scrap collections, relieving selling pressure on dealers. 2. Heavy shipments of export scrap to Japan should reduce surpluses in coastal areas and retard the inland flow of that material.

• **Chicago**—Prices continue to drift to lower levels in a listless market. Leading steel grades are off $1 to $2 a ton. Foundry grades have eased about $1. Although it's conceded that the bottom of the market may not have been reached, there is reason to believe a leveling off is occuring. The price level is approaching the point where the margin over labor costs in collecting and preparation is extremely small.

• **Philadelphia** — With domestic buying light, prices have undergone a further decline. However, Japan has placed orders for 65 cargoes, approximately 550,000 tons, for the second quarter, and while the amount is off about 130,000 tons from that shipped in the first quarter, and was placed at lower prices, the feeling is that the purchase will tend to firm the market before too long. In any case, traders think the present downtrend is nearing a point where a leveling out can be expected.

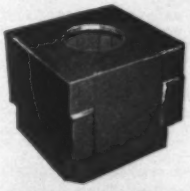
The latest reductions include a $2 cut in the price of No. 1 bundles and No. 1 busheling to $38 delivered. Also, electric furnace bundles are off to $40, while machine shop turnings are unchanged, but nominal, at $21. Low phos structurals and plates are easier at $40-$43; couplers, springs, and wheels are $47; and rail crops (2 ft and under) $63-$64. Malleable is lower at $63.

• **New York** — Brokers' buying prices on steel scrap have firmed, but quotations are generally unchanged. Although Japan's new purchases of 550,000 tons for second quarter are lighter than for the first quarter, the buying has stabilized the local market to a certain extent. The only reduction last week was in cast iron, with heavy breakable off $1 a ton to $35-$36.

• **Cleveland** — Small purchases of steelmaking grades in the Valley at prices about $1 below those of

(*Please turn to Page* 161)

COVERED HOT TOP BRICK
INGOT MOLD PLUGS



EUREKA
FIRE BRICK WORKS
MT. BRADDOCK, FAYETTE CO., PA.
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CLYMER ASSOCIATES, INC.
DEPT. 5A, COLONIAL TRUST BLDG., READING, PA.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Mar. 9, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 9	$34.33
Mar. 2	35.00
Feb. Avg.	38.87
Mar. 1959	40.40
Mar. 1955	37.50

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	28.00-29.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	24.00-25.00
No. 1 busheling	*34.00-35.00*
No. 1 factory bundles	*43.00-44.00*
Machine shop turnings	*17.00-18.00*
Mixed borings, turnings	*17.00-18.00*
Short turnings	*24.00-25.00*
Cast iron borings	*24.00-25.00*
Cut structurals:	
2 ft and under	*42.00-43.00*
3 ft and under	*41.00-42.00*
Heavy turnings	*31.00-32.00*
Punchings & plate scrap	*46.00-47.00*
Electric furnace bundles	*44.00-45.00*

Cast Iron Grades

No. 1 cupola	50.00-51.00
Stove plate	46.00-47.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt	*37.00-38.00*
Rails, 2 ft and under	*58.00-59.00*
Rails, 18 in. and under	*59.00-60.00*
Random rails	*53.00-54.00*
Angles, splice bars	*47.00-48.00*
Railroad specialties	*44.00-45.00*
Rails, rerolling	64.00-65.00

Stainless Steel Scrap

18-8 bundles & solids	225.00-230.00
18-8 turnings	120.00-125.00
430 bundles & solids	125.00-130.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt., indus.	*32.00-35.00*
No. 1 hvy melt., dealer	*30.00-31.00*
No. 2 hvy melting	*26.00-27.00*
No. 1 factory bundles	*34.50-35.50*
No. 1 dealer bundles	*31.00-32.00*
No. 2 bundles	19.00-20.00
No. 1 busheling, indus.	*32.00-35.00*
No. 1 busheling dealer	*30.00-31.00*
Machine shop turnings	*15.00-16.00*
Mixed borings, turnings	*17.00-18.00*
Shovel turnings	*17.00-18.00*
Cast iron borings	*17.00-18.00*
Cut structurals, 3 ft	*38.00-39.00*
Punchings & plate scrap	*40.00-41.00*

Cast Iron Grades

No. 1 cupola	*45.00-46.00*
Stove plate	*42.00-43.00*
Unstripped motor blocks	*39.00-40.00*
Clean auto cast	*53.00-54.00*
Drop broken machinery	*53.00-54.00*

Railroad Scrap

No. 1 R.R. heavy melt	*33.00-34.00*
R.R. malleable	*55.00-56.00*
Rails, 2 ft and under	53.00-54.00
Rails, 18 in. and under	54.00-55.00
Angles, splice bars	*45.00-46.00*
Axles	*51.00-52.00*
Rails, rerolling	*53.00-54.00*

Stainless Steel Scrap

18-8 bundles, solids	210.00-215.00
18-8 turnings	110.00-115.00
430 bundles & solids	115.00-120.00
430 turnings	55.00-60.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	17.00-18.00
No. 1 bundles	31.00-32.00
No. 2 bundles	*14.00-15.00*
No. 1 busheling	28.00-29.00
Machine shop turnings	*12.00-13.00*
Mixed borings, turnings	*11.00-12.00*
Shovel turnings	*10.00-11.00*

Cast Iron Grades

No. 1 cupola	40.00-41.00
Stove plate	34.00-35.00
Heavy breakable	34.00-35.00
Unstripped motor blocks	26.00-27.00
Charging box cast	34.00-35.00
Clean auto cast	47.00-48.00

CLEVELAND

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 factory bundles	40.00-41.00
No. 1 bundles	*33.00-34.00*
No. 2 bundles	*20.00-21.00*
No. 1 busheling	*33.00-34.00*
Machine shop turnings	*12.00-13.00*
Shovel turnings	*16.00-17.00*
Mixed borings, turnings	*16.00-17.00*
Cast iron borings	*16.00-17.00*
Cut foundry steel	35.00-36.00
Cut structurals, plate 2 ft and under	*43.00-44.00*
Low phos. punchings & plate	*34.00-35.00*
Alloy free, short shovel turnings	*17.00-18.00*
Electric furnace bundles	*34.00-35.00*

Cast Iron Grades

No. 1 cupola	49.00-50.00†
Charging box cast	33.00-34.00†
Heavy breakable cast	35.00-36.00†
Stove plate	44.00-45.00†
Unstripped motor blocks	37.00-38.00
Brake shoes	35.00-36.00†
Clean auto cast	52.00-53.00†
Burnt cast	42.00-43.00†
Drop broken machinery	54.00-55.00

Railroad Scrap

R.R. malleable	*52.00-53.00*
Rails, 2 ft and under	*56.00-57.00*
Rails, 18 in. and under	*57.00-58.00*
Rails, random lengths	*49.00-50.00*
Cast steel	*42.00-43.00*
No. 1 railroad cast	*52.00-53.00*
Railroad specialties	*45.00-46.00*
Angles, splice bars	*45.00-46.00*
Rails, rerolling	*60.00-61.00*

Stainless Steel (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	205.00-210.00†
18-8 turnings	105.00-110.00†
430 clips, bundles, solids	110.00-115.00†
430 turnings	35.00-45.00†

YOUNGSTOWN

No. 1 heavy melting	*36.00-37.00*
No. 2 heavy melting	27.00-28.00†
No. 1 busheling	*36.00-37.00*
No. 1 bundles	*36.00-37.00*
No. 2 bundles	*23.00-24.00*
Machine shop turnings	*15.00-16.00*
Shovel turnings	*20.00-21.00*
Cast iron borings	*20.00-21.00*
Low phos.	*37.00-38.00*
Electric furnace bundles	*37.00-38.00*

Railroad Scrap

No. 1 R.R. heavy melt	*37.00-38.00*

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	31.00-32.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Shovel turnings	21.00-22.00
Machine shop turnings	17.00-18.00
Cast iron borings	19.00-20.00
Low phos. structurals and plate, 2 ft and under	41.00-42.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.00-48.00
No. 1 machinery	49.00-50.00

Railroad Scrap

Rails, random lengths	44.00-45.00
Rails, 3 ft and under	50.00-51.00
Railroad specialties	41.00-42.00

CINCINNATI

(Broker's buying prices; f.o.b. shipping point)

No. 1 heavy melting	31.50-32.50
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.50-32.50
No. 2 bundles	21.00-22.00
No. 1 busheling	31.50-32.50
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Shovel turnings	*18.00-19.00*
Cast iron borings	18.00-19.00
Low phos. 18 in.	*44.00-45.00*

Cast Iron Grades

No. 1 cupola	*44.00-45.00*
Heavy breakable cast	37.00-38.00
Charging box cast	39.00-40.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt	*37.00-38.00*
Rails, 18 in. and under	*58.00-59.00*
Rails, random lengths	*49.00-50.00*

PHILADELPHIA

No. 1 heavy melting	36.00
No. 2 heavy melting	32.00
No. 1 bundles	*38.00*
No. 2 bundles	*23.00*
No. 1 busheling	*38.00*
Electric furnace bundles	*40.00*
Mixed borings, turnings	21.00†
Shovel turnings	24.00-25.00†
Machine shop turnings	21.00†
Heavy turnings	29.00-30.00†
Structurals & plates	*40.00-43.00*
Couplers, springs, wheels	*47.00*
Rail crops, 2 ft & under	*63.00-64.00*

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	44.00
Drop broken machinery	52.00
Malleable	*63.00†*

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	8.00-9.00†
Mixed borings, turnings	9.00-10.00
Shovel turnings	13.00-14.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	*35.00-36.00*

Stainless Steel

18-8 sheets, clips, solids	200.00-205.00
18-8 borings, turnings	90.00-95.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	85.00-90.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 1 busheling	30.00-31.00
Machine shop turnings	9.00-10.00
Shovel turnings	14.00-15.00
No. 1 cast	39.00-40.00
Mixed cupola cast	34.00-35.00
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*31.00-32.00*
No. 2 heavy melting	*26.00-27.00*
No. 1 bundles	*31.00-32.00*
No. 2 bundles	*21.00-22.00*
No. 1 busheling	*37.00-38.00*
Cast iron borings	12.00-13.00
Machine shop turnings	21.00-22.00
Shovel turnings	22.00-23.00
Bar crops and plate	41.00-42.00
Structurals & plate	*40.00-41.00*
Electric furnace bundles	*37.00-38.00*
Electric furnace:	
3 ft and under	*36.00-37.00*
2 ft and under	*35.00-36.00*

Cast Iron Grades

No. 1 cupola	49.00-50.00
Stove plate	49.00-50.00
Charging box cast	29.00-30.00
Unstripped motor blocks	38.00-39.00
No. 1 wheels	41.00-42.00

Railroad Scrap

No. 1 R.R. heavy melt	*34.00-35.00*
Rails, 18 in. and under	53.00-54.00
Rails, rerolling	*54.00-55.00*
Rails, random lengths	47.00-48.00
Angles, splice bars	*44.00-45.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	35.00
No. 2 heavy melting	33.00
No. 1 bundles	*37.00*
No. 2 bundles	24.00
No. 1 busheling	*37.00*
Machine shop turnings	16.50
Shovel turnings	18.50

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	41.00†
Heavy breakable cast	41.00†
Unstripped motor blocks	*41.00†*
Clean auto cast	*51.00*
Stove plate	43.00

Railroad Scrap

No. 1 R.R. heavy melt	40.00
Rails, 18 in. and under	50.00
Rails, random lengths	45.00
Rails, rerolling	58.00†
Angles, splice bars	45.00†

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	36.00-37.00
No. 2 bundles	21.00-22.00
Machine shop turnings	15.00-16.00
Shovel turnings	19.00-20.00
Low phos. plate & structurals	*41.00-42.00†*

Cast Iron Grades

No. 1 cupola	*39.00-40.00†*
Heavy breakable	29.00†
Foundry malleable	*36.00-37.00†*
Unstripped motor blocks	*33.00-33.50†*

Railroad Scrap

No. 1 R.R. heavy melt	36.00-37.00†

LOS ANGELES

(Brokers' buying prices)

No. 1 heavy melting	*35.00*
No. 2 heavy melting	*32.00*
No. 1 bundles	*31.00-33.00*
No. 2 bundles	*18.00*
Machine shop turnings	*16.00*
Shovel turnings	*15.00*
Cast iron borings	*15.00*
Cut structurals and plate 1 ft and under	*45.00*

Cast Iron Grades

No. 1 cupola	*42.00-43.00*

Railroad Scrap

No. 1 R.R. heavy melt	39.00

PORTLAND, OREG.

No. 1 heavy melting	37.00
No. 2 heavy melting	34.00
No. 1 bundles	34.00
No. 2 bundles	27.00
Shovel turnings	22.00
Electric furnace bundles	44.00-45.00

Cast Iron Grades

No. 1 cupola	36.00
Heavy breakable	35.00
Unstripped motor blocks	30.00
Stove plate	24.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 1 bundles	27.00
No. 2 bundles	20.00-22.00
Machine shop turnings	17.00†
Mixed borings, turnings	17.00†
Electric furnace No. 1	45.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	30.00
Unstripped motor blocks	25.00
Stove plate (f.o.b. plant)	21.00†

SAN FRANCISCO

No. 1 heavy melting	*35.00*
No. 2 heavy melting	*31.00*
No. 1 bundles	*31.00*
No. 2 bundles	*20.00*
Machine shop turnings	*14.00*
Mixed borings, turnings	*14.00*
Cast iron borings	*14.00*
Heavy turnings	*14.00*
Shovel turnings	*14.00*
Cut structurals, 3 ft	*40.00*

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices)

No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	24.00
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory:	
Prepared	32.25
Unprepared	26.25
Shovel turnings	17.00

Cast Iron Grades‡

No. 1 machinery cast	46.50-48.00

†Nominal.
‡F.o.b. Hamilton, Ont.

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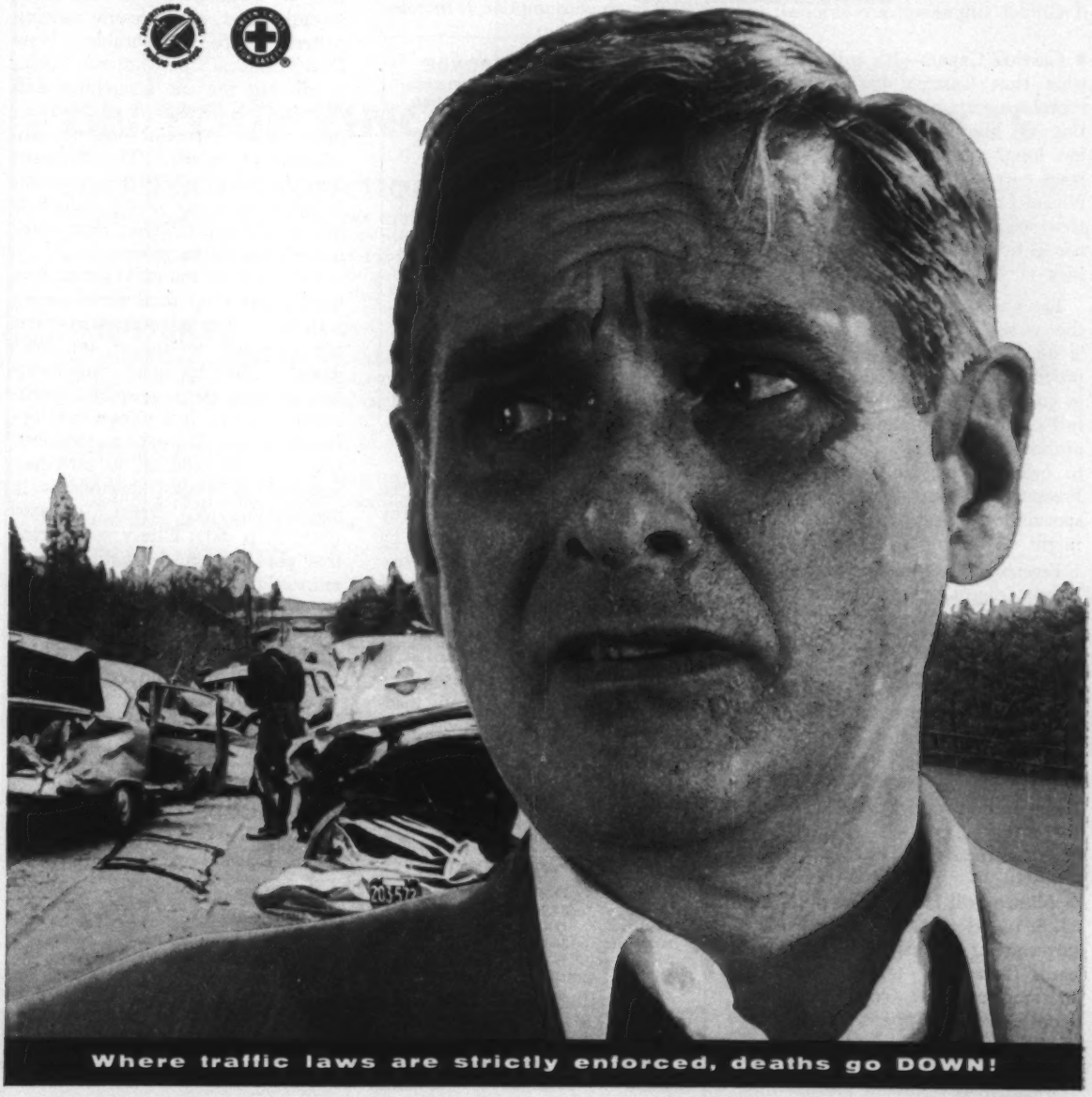
You can do something about traffic accidents! Drive safely yourself—obey the law. Sure. But you can do a lot *more!* Traffic accidents affect *everybody.* Reducing them is a community problem. Its solution calls for systematic, organized effort and cooperation with public officials—for teamwork and leadership. Here is where *you* can help. Join with others who are working actively to promote safe driving and secure strict enforcement of all traffic laws. Make your influence count. *Support your local Safety Council!*



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Enough Nickel Without Cuba

Even if shipments are cut off by the Castro government, no shortage is expected over the foreseeable future. Freeport Nickel shuts down its Moa Bay operation

Nonferrous Metal Prices, Pages 160 & 161

POLITICAL instability in Cuba poses no threat to the domestic supply of nickel. There will be enough metal available to fill your needs for the foreseeable future even if Cuban shipments are stopped.

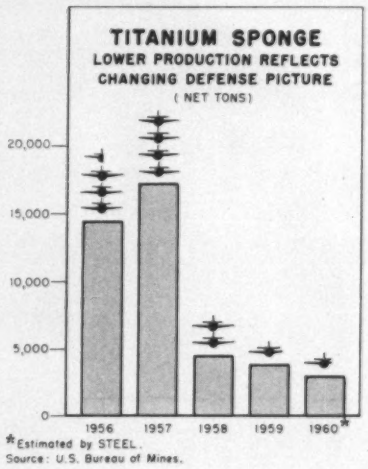
• **Castro's Capers**—It's entirely possible that Castro's harassment of nickel interests might result in shutting off the flow of metal before too long. Shipments have already been curtailed. Last week Freeport Nickel Co. announced that it plans to suspend operations of its nickel-cobalt mine and concentrating facilities at Moa Bay.

Freeport's problem: Because of the virtually confiscatory taxes, it is no longer able to obtain funds previously arranged for and needed to complete construction and attain full commercial production. Cuban authorities have steadfastly refused to even discuss the situation with Freeport representatives, leading to speculation that nationalization might be in the wind.

Freeport didn't make such a move lightly, especially since Cuban officials say they have a right to "intervene" within 30 days after the facility is closed. The company has $75 million tied up in its Cuban mines and concentrating plant and an additional $44 million in its Port Nickel, La., refinery—all of which will be closed down. Capacity of the operation was rated at 50 million lb of nickel and 4.4 million lb of cobalt annually.

• **Nicaro Still Hazy**—The other big U. S. nickel operation in Cuba, the government owned facility at Nicaro, is working under a 90 day moratorium that runs out this month. What happens then is anyone's guess. Certainly, if the extreme tax measures sponsored by the Castro government are put into effect, it would be difficult for U. S. interests to operate Nicaro at a profit.

• **Where We Stand**—What if all Cuban nickel were cut off? Metalmen say there will be no shortage even though consumption is increasing in this country and other Free World nations. Here's why: Any short term pinch could be met by release of some (or all) the electrolytic nickel from the government's Defense Production Act inventory (more than 100 million lb). In addition, most of the 19 million lb of DPA nickel that was released in January is still standing on the loading docks waiting for a buyer. Another source: Nicaro nickel available in this country.



In 1961, International Nickel Co.'s new Canadian facilities, with an annual capacity of 75 million lb, will go into full production. And metalmen say we can look forward to producers expanding present facilities and opening new ones when the need arises.

In The Markets

• **Magnesium's on the Move** — Automakers are taking another look at magnesium. It lost favor several years ago because pricing patterns were unfavorable. Now Dow Chemical Co., Midland, Mich., is offering the car companies and suppliers of diecastings and permanent molds a special deal for development projects. The discount puts the price of AZ91B magnesium at 30.78 cents per pound, which is less than 5 cents higher than comparable aluminum grades.

As a result, industry researchers have stepped up their development activities. Several additional parts are expected to appear on 1961 models. Most are small components like steering parts, gearshift mechanisms, oil and fuel pumps, and defroster vents. At least one producer, Chevrolet, is expected to introduce some of its diecast dashboards in magnesium. As STEEL reported (Feb. 8, p. 60), Chevy is sourcing this part in zinc, aluminum, and magnesium, to compare costs.

• **Zinc Statistics Good** — Slab zinc shipments last month hit 82,147 tons, 1000 tons under January's level, but the per-day rate was better since February was shorter.

NONFERROUS PRICE RECORD

	Mar. 9 Price	Last Change	Previous Price	Feb. Avg	Jan. Avg	Mar., 1959 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	26.000	26.000	24.700
Copper	33.00-35.00	Dec. 23, 1959	33.00	34.000	34.000	32.031
Lead	11.80	Dec. 21, 1959	12.30	11.800	11.800	11.238
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	100.375	Mar. 9, 1960	100.50	101.170	99.875	103.000
Zinc	13.00	Jan. 8, 1960	12.50	13.000	12.917	11.000

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig 99.8%, Velasco, Tex.

LOOK FOR THE DIAMONDS—SIGN OF FINISHING QUALITY

4 good reasons why you should use IRIDITE®

Chromate Conversion Coatings

ON YOUR ZINC OR CADMIUM PRODUCTS

CORROSION PROTECTION

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PAINT BASE

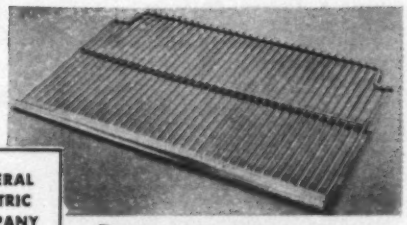
For an extremely tight bond for either baked or air-dried paints, non-porous Iridite blocks moisture penetration—prevents formation of metallic soap products beneath paint coatings.

APPEARANCE

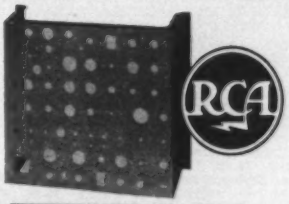
Your choice of colors ranging from clear through yellow iridescent to olive drab. Bright Iridite finishes can also be dyed to provide other color effects.

SPECIAL EFFECTS

Iridite, in combination with other Allied Research processes, can provide a wide variety of finishes. As an example, Iridite 8-P applied to zinc or cadmium, followed by an application of Irilac, gives a highly attractive simulated brass finish.



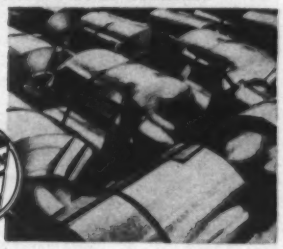
GENERAL ELECTRIC COMPANY



RCA

Medalist

NATIONAL LOCK COMPANY



WEIRTON STEEL COMPANY

IRIDITE—a specialized line of chromate conversion coatings for nonferrous metals. Easily applied at room temperatures with short immersion times, manually or with automatic equipment. Forms a thin film which becomes an integral part of the metal. Cannot chip, flake or peel. Special equipment, exhaust systems or highly trained personnel not required.

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Allied Research Products, Inc.

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Chemical and Electrochemical Processes, Anodes, Rectifiers Equipment, and Supplies for Metal Finishing

IRIDITE® Chromates | IRILAC® Coatings | ISOBRITE® Brighteners | ARP® Supplies | WAGNER Equipment

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.60; No. 43, 25.90; No. 195, 30.70; No. 214, 31.50; No. 356, 26.30, 30 lb ingots; 10 lb ingots, add 0.4 cent per lb; 6 lb ingots, add 0.6 cent per lb.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 35.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 50 lb, $11 per lb f.o.b. Minneapolis; 50-99 lb, $10; 100-499 lb, $9.50; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $213-215 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom.; sheet, $55 per lb nom.

Tellurium: $3.00 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 100.375; prompt, 100.125.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.50-4.25.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb., New York basis, add 0.50. High grade, 14.25; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.50; No. 2, 17.00; No. 5, 16.75 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.25-28.00; No. 12 foundry alloy (No. 2 grade), 25.00-25.25; 5% silicon alloy, 0.60 Cu max., 25.50-25.75; 13 alloy, 0.60 Cu max., 25.50-26.00; 195 alloy, 27.75-28.75; 108 alloy, 25.25-25.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.50; grade 2, 24.25; grade 3, 23.25; grade 4, 22.75.

Brass Ingot: Red brass, No. 115, 30.75; tin bronze, No. 225, 41.50; No. 245, 36.00; high-leaded tin bronze, No. 305, 35.25; No. 1 yellow, No. 405, 24.75; manganese bronze, No. 421, 29.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $4.00-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base, f.o.b. customer custody.

Thickness Range (in.)	Widths (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.10-47.70
0.136-0.096	24-72	72-180	45.50-48.70
0.096-0.077	24-72	72-180	46.20-50.00
0.077-0.068	24-72	72-180	46.70-51.70
0.068-0.061	24-72	72-180	46.70-55.50
0.061-0.048	24-72	72-180	47.30-57.30
0.048-0.038	24-72	72-180	47.80-60.20
0.038-0.030	24-72	72-180	48.20-65.30
0.030-0.024	24-60	72-180	48.70-56.60
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	44.60	49.40
5050-F	45.70	50.50
3004-F	46.70	52.40
5062-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base, 12 ft lengths.

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	72.90	75.80	....	....
0.188	....	....	....	78.20
0.250	58.00	61.60	70.70	72.30
0.375	57.20	62.40	69.00	70.50
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	57.20	62.40	69.00	70.50
0.625	57.20	62.40	65.80	66.60
0.750	55.70	60.70	59.60	62.60
0.875	55.70	60.70	59.60	62.60
1.000	55.70	60.70	59.60	62.60
1.125	53.30	58.30	57.50	60.40
1.250	53.30	58.30	57.50	60.40
1.375	53.30	58.30	57.50	60.40
1.500	53.30	58.30	57.50	60.40
1.625	51.00	55.60	....	58.20
1.750	51.00	55.60	56.30	58.20
1.875	51.00	55.60	....	58.20
2.000	51.00	55.60	56.30	58.20
2.250	49.50	54.00	....	58.20
2.500	49.50	54.00	....	58.20
2.750	47.90	52.20	....	58.20
3.000	47.90	52.20	....	58.20
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.20-56.90; 6061, 43.20-56.90; 7075, 61.50-71.20; 7079, 66.50-76.20.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 31.55; 1¼ in., 42.75; 1½ in., 51.05; 2 in., 61.70; 3 in., 123.40; 4 in., 169.55; 5 in., 229.60; 6 in., 304.60; 8 in., 458.40; 10 in., 706.45 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	44.70-46.20	53.20-59.00
15-17	44.70-46.20	55.60-60.80
18-23	45.20-46.80	57.70-66.40
24-32	45.20-46.80	65.60-78.80
33-38	48.80-51.40	82.30-93.40
39-44	58.70-62.40	99.90-121.00

MAGNESIUM

Sheets and Plate: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 106.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 25.00-25.50; No. 2 heavy copper and wire, 21.50-22.00; light copper, 20.00-20.50; No. 1 composition red brass, 18.00-18.50; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 33.00c)		
	Sheets, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	57.13b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.875	20.625	19.875
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 16.50-17.00; new brass clippings, 14.50-15.00; light brass, 11.00-11.25; heavy yellow brass, 12.00-12.50; new brass rod ends, 12.00-12.50; auto radiators, unsweated, 13.50-14.00; cocks and faucets, 14.00-14.25; brass pipe, 14.00-14.25.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.00-9.50.

Monel: Clippings, 28.00-29.00; old sheets, 24.00-26.00; turnings, 20.00-22.00; rods, 28.00-29.00.

Nickel: Sheets and clips, 53.00-54.00; rolled anodes, 53.00-54.00; turnings, 41.00-42.00; rod ends, 53.00-54.00.

Zinc: Old zinc, 4.00-4.50; new diecast scrap, 4.00-4.50; old diecast scrap, 2.25-2.75.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 15.00-15.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 12.50-13.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16.50-17.00; segregated high copper clips, 15.50-16.00; mixed low copper clips, 15.50-16.00; mixed high copper clips, 15.00-15.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.75-12.00; clean borings and turnings, 10.50-11.00; segregated low copper clips, 15.50-16.00; segregated high copper clips, 14.50-15.00; mixed low copper clips, 15.00-15.50; mixed high copper clips, 14.00-14.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivery refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.25; light copper, 22.00; refinery brass (60% copper) dry copper content, 22.25-22.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.25; light copper, 22.00; No. 1 composition borings, 20.50; No. 1 composition solids, 21.00; heavy yellow brass solids, 15.50; yellow brass turnings, 14.50; radiators, 16.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.

Copper: Flat-rolled, 50.04; oval, 48.00; 5000-10,000 lb; electrodeposited, 42.50; 2000-5000 lb lots; cast, 45.00, 5000-10,000 lb quatities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 118.50; 200-499 lb, 117.00; 500-999 lb, 116.50; 1000 lb or more, 116.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.40 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,900 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 78.50; 100-600 lb, 69.20; 700-1900 lb, 66.40; 2000-9900 lb, 64.60; 10,000 lb or more, 63.30.

Stannous Chloride (Anhydrous): 25 lb, 153.80; 100 lb, 148.90; 400 lb, 146.50; 800-19,900 lb, 105.60; 20,000 lb or more, 99.50.

Stannous Sulphate: Less than 50 lb, 139.00; 50 lb, 109.00; 100-1900 lb, 107.00; 2000 lb or more, 105.00.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 155)

a week ago have caused another downward revision in the lists. No. 1 heavy melting is quoted $36-$37 in the Valley and $33-$34 in this market. Generally, quoted prices are considered nominal.

A sale of No. 1 heavy melting industrial scrap to a major Valley steelmaker at $38 was reported last week. That's $11 a ton under the price paid on a previous purchase by the mill and is about $2 above the nominal price on dealer scrap.

• **Buffalo** — Consumer prices for leading grades of mill scrap declined $4 to $6 a ton 10 days ago on purchases for March delivery. No. 1 heavy melting sold at $32, down $5 from the previous sale. No. 2 heavy melting went at $28, off $6, and No. 2 bundles were moved at $24, down $4.

Prices for railroad scrap, low phos, and blast furnace material also are down $3 to $4 a ton. Prices on the cast iron grades are unchanged but are expected to follow the steel grades to lower levels.

• **Cincinnati**—Prices on the dealer level may have reached bottom on the principal steelmaking grades, but prices on the foundry grades are moving downward, last week slipping $1 a ton. The absence of purchases by a local mill is serving as a damper on the market. No. 1 heavy melting is now being quoted $31.50-$32.50.

• **St. Louis**—Little tonnage is moving here, partly due to adverse weather conditions. The mills have adequate supplies, and yard collections and shipments have fallen off. The situation has braked the market decline, but No. 1 bundles and No. 1 busheling dropped another $1 to $37.

• **Birmingham** — Prices have declined another $1 a ton, being influenced to some extent by offers of dealers along the Tennessee and Mississippi Rivers who seldom ship material into this market. An Atlanta mill bought No. 2 heavy melting and No. 2 bundles at prices $5 below those prevailing a month ago. A large local electric furnace operator bought some material at $1 under what he paid a month ago. Dealers say low prices and winter weather are drying up yard intake.

• **Houston**—Demand is depressed and the market is weak. Cast iron grades declined an average of $3 a ton last week. Foundry operations are far below capacity, and inventories are heavy. Broker buying of steel scrap is limited.

• **Seattle** — There were no price changes reported last week, but the market continues soft, with bundles notably weak. Sales are limited, with large consumers holding substantial inventories. The export section is quiet, but shippers are reported assembling tonnage at Tacoma, Wash., for shipment late this month to Japan.

• **Los Angeles** — Scrapmen are awaiting the outcome of negotiations with Japanese buyers for their April-May-June requirements. Prices are off about $3 a ton, with No. 1 heavy melting quoted at $35. Prices

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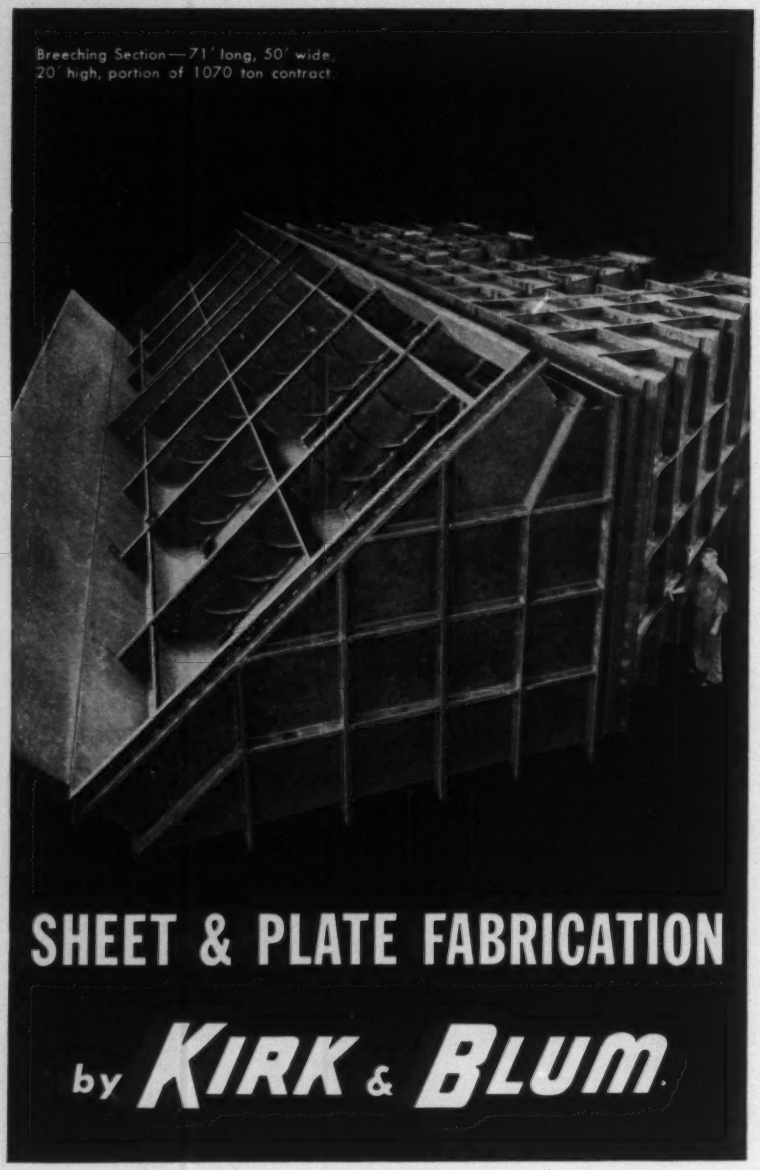
Penton Bldg. Cleveland 13, Ohio

Representatives Wanted

MANUFACTURERS REPRESENTATIVES wanted for southern states and states west of Illinois to sell electro-zinc coated steel in coils up to 36 in. wide and enamel coated steel in coils up to 60 in. wide. AAA-1 concern. Reply Box 836, STEEL, Penton Bldg., Cleveland 13, Ohio.



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Heavy assemblies, up to ½" thickness are produced, pre-assembled and loaded for shipping in a 50' x 480' bay with overhead handling capacity up to 25 tons.

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THE KIRK & BLUM MANUFACTURING CO., 3226 FORRER STREET, CINCINNATI 9, OHIO

BREECHINGS • STACKS • AIR & GAS DUCTS • CASINGS • LOUVERS
BINS & HOPPERS • INSULATION JACKETING • CONTROL PANELS & DESKS

on cast scrap are weak, and foundries are buying hand to mouth.

• **San Francisco**—A $3 per ton drop in the top grades of steelmaking scrap has carried prices to the lowest level in a year, and the bottom of the decline hasn't been reached. There's little mill buying at the lower levels. However, it's thought that the marked down prices have stimulated Japanese buying.

Steel Bars . . .

Bar Prices, Page 144

While merchant bar demand is off somewhat, prospects still look good for a substantial tonnage movement through April. Hot rolled carbon bars are available for delivery in late April and early May.

In general, buying is diversified. Automotive requirements are under the volume that had been anticipated earlier this year.

Reinforcing bars are being produced in good volume in anticipation of an early seasonal pickup in construction. Considerable highway work is in prospect. On the West Coast more than 6000 tons of reinforcing bars for projects in Washington State are being held back until litigation and financing problems are disposed of.

Defense Units Combined

Ford Motor Co., Dearborn, Mich., established a Defense Products Group at Newport Beach, Calif. Gerald L. Lynch is general manager of the Aeronutronic Div. and vice president of the group. He also will direct the operation of the following activities: Special Military Vehicles, Paul Klotsch, director; Mobilization Planning & Defense Sales, D. C. Pippel, manager; and Defense Contract Administration, F. S. Kipps, manager.

Bendix to Change Name

Bendix Aviation Corp., South Bend, Ind., plans to change its name to Bendix Corp. about June 1. The corporation makes many products outside the aviation field, including automotive, electronic, nuclear, missile and space, marine, machine tool, and industrial products.

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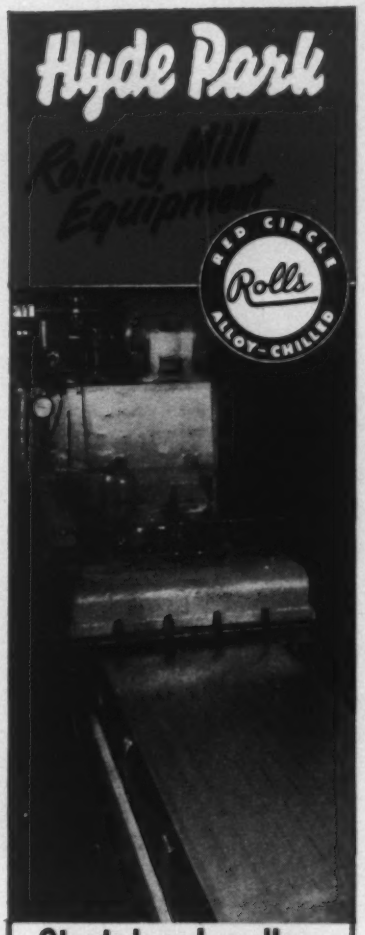

Stretcher Levellers

Complete range of stretching capacities from 150 to 750 tons, for levelling ferrous and non-ferrous sheets in sizes up to 120" wide x 500" long.

Speeds and length of "stretch" to meet all requirements.

Adaptable for automatic cycling.

Bar Mills • Merchant Mills • Sheet and Strip Mills • Pinion Stands Roller Tables • Reduction Drives Stretcher Levellers • Roll Lathes • Guillotine Shears Special Machinery • Sheet Mill Shears • Machine Work

Hyde Park
FOUNDRY and MACHINE CO.
HYDE PARK
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Rolls
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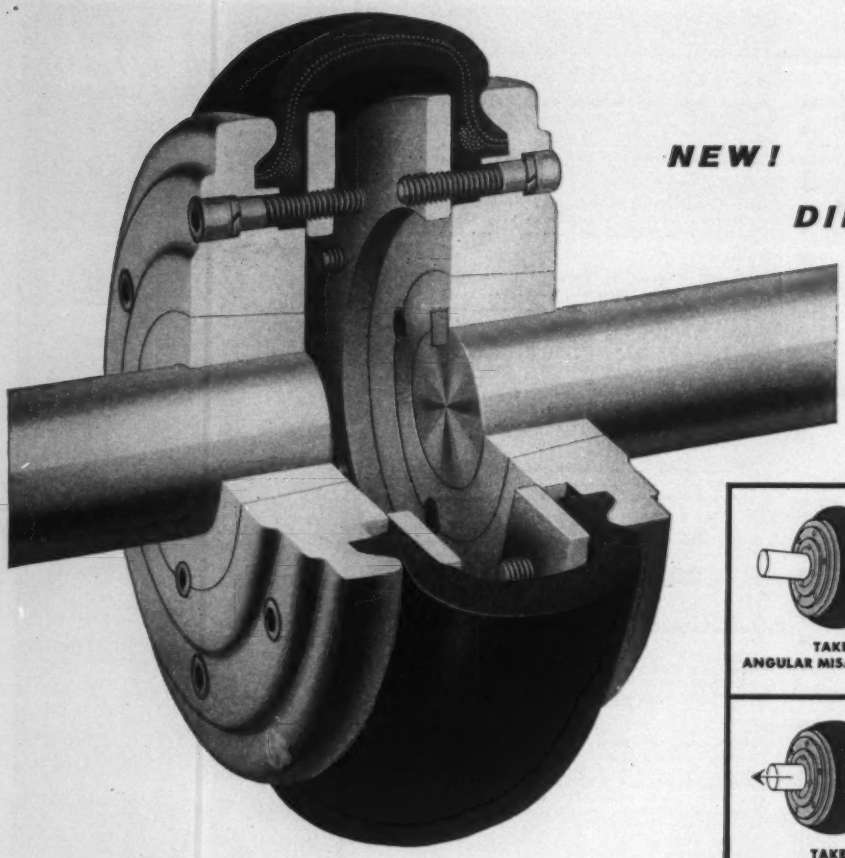
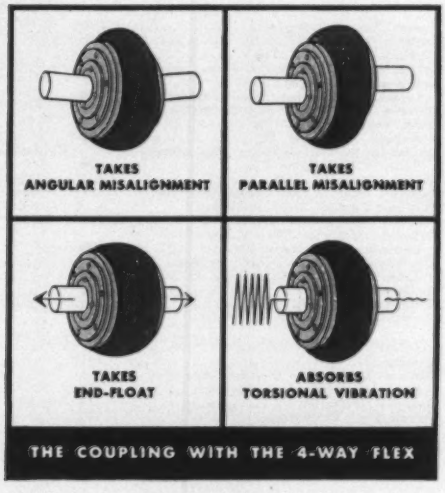
Gray Iron Castings



NEW!

DIFFERENT!



DODGE

Para•flex

FLEXIBLE CUSHION COUPLING

THIS coupling "swallows up" shaft misplacements. It automatically compensates for end-float, parallel misalignment, angular misalignment *or any combination of all three.* Moreover, it cushions the stresses of shock loads. And it absorbs torsional vibration—reducing noise and protecting machinery from vibration's destructive forces.

Here is a new type of performance—made possible by the development of a tire-like flexing element. Synthetic tension members, bonded together in rubber, give this element the stamina and dependability of modern, high-speed, high-load, shock-absorbing truck tires—and the ability to respond magically to all manner of changing shaft conditions.

Para-flex takes minimum space on the shaft. Mounting is simplified through the use of standard Taper-Lock bushings—no reboring, no machining. Safety is promoted by flush design; there are no protruding parts. No lubrication is required, no periodic inspection. And since the flexible member is molded with a transverse split, it can be replaced *without moving either the driver or driven machine.*

Para-flex Couplings are stocked by Dodge Distributors in popular transmission sizes. They are available from factory stock in capacities up to 2000 hp at 1080 rpm. Call your distributor for a coupling to *make your own test.* You'll witness something revolutionary!

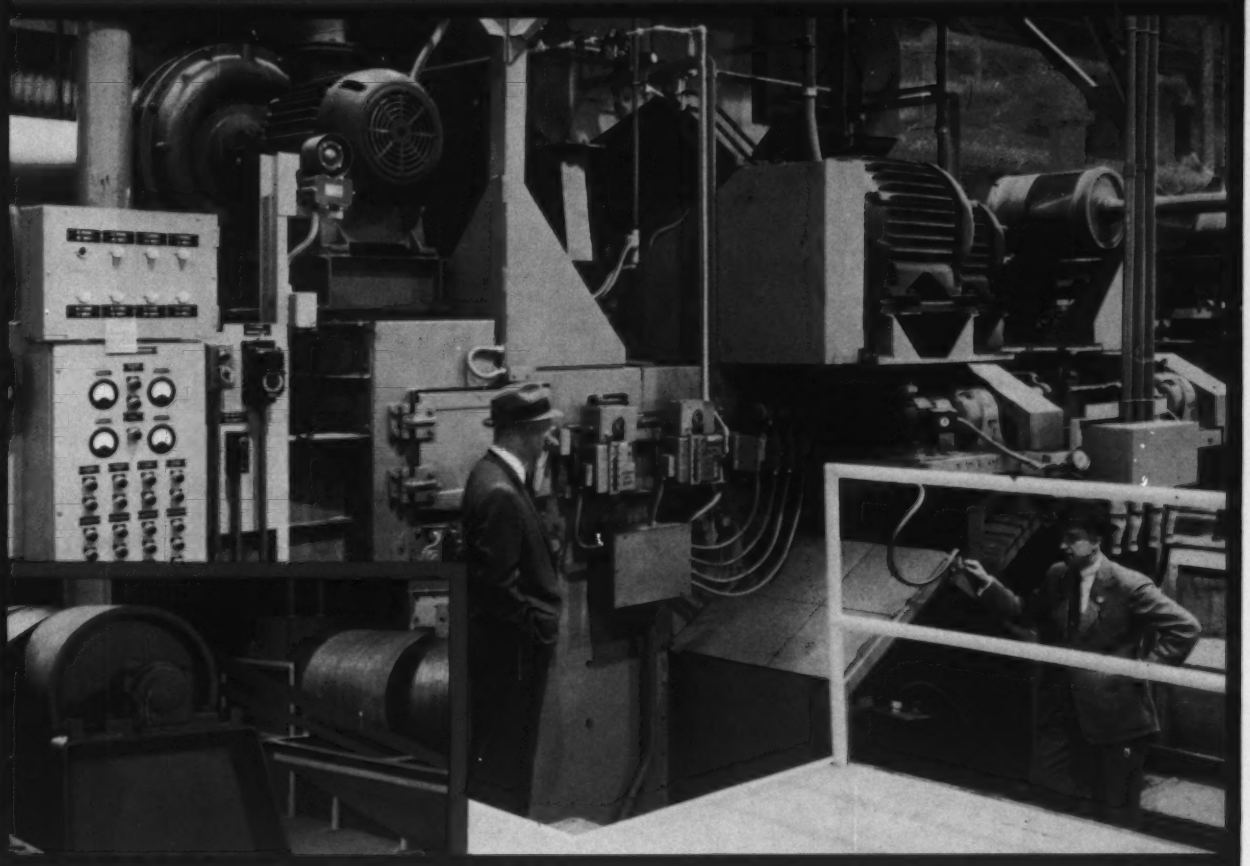
DODGE MANUFACTURING CORPORATION, 4400 Union, Mishawaka, Ind.

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

PUSH-BUTTON DESCALING WITH ROTOBLAST!



Universal Cyclops uses Pangborn Rotoblast Descaling for flexibility in automation

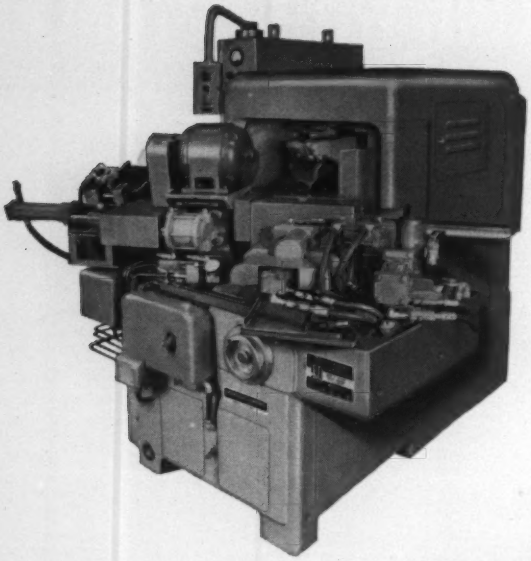
Devoted entirely to the production of cold rolled stainless steel strip, the new Coshocton, Ohio plant of Universal Cyclops Steel Co. is one of the most completely modern plants in the country.

Among its advanced equipment, the company uses a Pangborn Rotoblast Descaling Machine in a 659 ft. fully-automated line. This machine—requiring no operator—continuously blast cleans two strands of steel simultaneously at speeds up to 80 LFM. To provide a high degree of flexibility, it has individual strand control and permits changing the position of Rotoblast wheels at the touch of a button. Abrasive velocity and volume are also variable and two-speed motors give a choice of 50 h.p. at 1200 RPMs or 75 h.p. at 1800 RPMs, depending on type and thickness of work.

Rotoblast's efficiency and adaptability to individual descaling problems have proved the value of Rotoblast to Universal Cyclops. They can in your plant. For more information, talk to the Pangborn man in *your* area or write PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment—Rotoblast Steel Shot and Grit.*

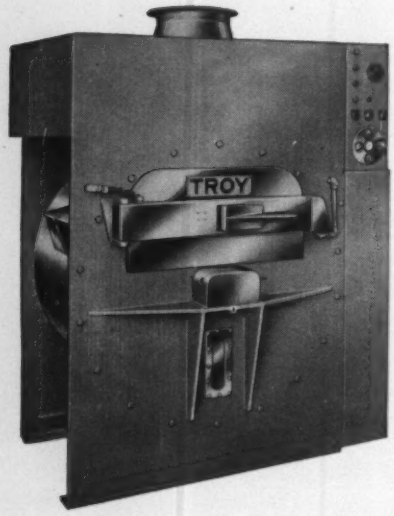
Pangborn

Cleans it fast with **ROTOBLAST**®



Jones and Lamson Machine Company's Automated Model E Form Grinder is designed to grind the helical form on a steering worm for a major automotive manufacturer. Cutler-Hammer Motor Control is supplied with these machines.

Miller Electric Manufacturing Company, Inc. installs Cutler-Hammer Three-Star Contactors on their Gold Star SR-400 Rectifier Type D-c Welders because, "Our use of Cutler-Hammer Contactors has completely eliminated contact welding and interphase or line-to-load flash-over."



The Troy Laundry Machine Division of American Machine and Metals, Inc. uses Cutler-Hammer Three-Star Motor Control on this Combination Washer-Extractor. Rated at 100 lbs. dry weight capacity, it processes industrial laundry with minimum effort, time, and costs.

Choice of the leaders

CUTLER·HAMMER CONTROL C·H

...the mark of better machines

The proper performance of any machine requires dependable, trouble-free service from the motor control which directs and protects it. This is why leading machinery builders use Cutler-Hammer Control. It installs easier . . . works better . . . and lasts longer.

For prompt attention to your control requirements, write Dept. E213, Cutler-Hammer Inc., Milwaukee 1, Wisconsin.

CUTLER·HAMMER

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